# Science Diplomacy Affirmative

## File Explanation

This affirmative advocates increasing scientific cooperation with Russia over studying permafrost thaw in the Russian Arctic. It is meant to be an exploration affirmative, based on evidence that defines exploration as scientific research.

#### The problem with the status quo

Russia accounts for about 50% of the Arctic, and about 60% of Russia is made of permafrost. Prior to 2022, the United States and other countries were researching permafrost thaw in Russia to study climate change.

In 2022, Russia invaded Ukraine. The Arctic Council, an intergovernmental body representing all eight Arctic states, cut off all projects with Russia. Russia was chair of the Arctic Council at the time, so the other seven states boycotted the Arctic Council until Norway took over the chair in 2023. The United States and the other Arctic powers cut off all research cooperation with Russia due to Ukraine.

#### What does the plan advocate?

The plan increases United States scientific exploration of permafrost in the Russian Arctic “under the auspices of the Agreement on Enhancing International Arctic Scientific Cooperation.” This Arctic Science Agreement was formally negotiated in the Arctic Council in 2017, and it establishes protocols for one country’s scientists to work in another Arctic country. It governs things like visas, data sharing, and transfer of equipment.

The plan would also have to increase funding for Arctic science, because the Trump administration has severely cut it.

Even though the Arctic Council is mostly shunning Russia, this agreement is still in force. If the United States requested to send scientists to Russia, it’s likely that Russia would agree, because they would see it as the first step to having their status restored in the Arctic Council.

#### Advantage 1: Arctic Science

This advantage argues that because most permafrost is in Russia, it’s imperative that climate scientists can study it to create effective global climate models. Permafrost thaw is dangerous for many reasons, but this advantage outlines two:

1. Permafrost thaw creates a positive feedback loop for global warming. Permafrost contains vast reserves of carbon – more than all that is currently in the atmosphere. Thaw releases both carbon dioxide and methane into the atmosphere. It’s a **feedback loop** because warmer temperatures cause thaw, which releases more carbon, which causes warmer temperatures, which causes thaw. The advantage says this could reach a **tipping point** – essentially a point of no return, where the loop becomes self sustaining and makes catastrophic warming inevitable.
2. Permafrost thaw releases novel pathogens into the environment. There are microbes that have been trapped for decades, or even hundreds or thousands of years in the ice. As it thaws, new diseases will emerge that could be the source of global pandemics.

The affirmative claims to solve this in two ways. First, Russia’s permafrost is extremely important to understanding the Arctic’s impact on global warming, and to understanding how it’s possible to mitigate or adapt to permafrost thaw. Having accurate data is important to developing adaptation measures. Some 1ac evidence describes adaptation as technological solutions to cool the ground (like planting cover crops) to slow the rate of permafrost thaw. Knowing where to do this is important because not all permafrost thaw is equal. In some places (particularly in Russia), thaw is abrupt rather than gradual, but why this occurs is understudied.

Second, studying permafrost thaw can determine where it’s occurring and allows disease surveillance for early detection and containment of diseases.

The weakness of this advantage is that the Trump administration probably won’t ever take action on adaptation or mitigation of global warming. The advantage tries to address this by saying it’s in Trump’s interest to protect Arctic infrastructure. Permafrost thaw has catastrophic economic impacts on Arctic infrastructure (military bases sink into the ground). So even if Trump doesn’t believe in warming, he does have incentives to protect infrastructure that’s threatened by permafrost thaw and implement adaptation measures.

#### Advantage 2: Arctic Diplomacy

This advantage argues that the risk of war in the Arctic is high, because of the increase in tensions and military buildup that has been steadily occurring since Ukraine. It also claims that **hybrid tactics** (disruptive actions short of war, like cyber attacks or cutting undersea cables) increase the risk of **miscalculation** (war could start because one side thinks the other side is about to attack).

The advantage claims that prior to 2022, the Arctic Council was a successful institution in dampening incentives for Arctic war, and that it was successful in encouraging international cooperation to reduce tensions and miscalculation.

The affirmative claims to solve by saying that renewing scientific cooperation with Russia is the first step to restoring Russian status in the Arctic Council.

## 1ac

### 1ac – Plan

The United States federal government should significantly increase its scientific exploration of permafrost in the Russian Arctic under the auspices of the Agreement on Enhancing International Arctic Scientific Cooperation.

### 1ac – Arctic Science Advantage

#### Contention 1 is Arctic Science

#### The United States canceled its scientific exploration of the Russian Arctic after the invasion of Ukraine

Danielle Bochove, 2023 – senior reporter, Bloomberg News “Climate Science in Arctic ‘Broken’ as US and Europe Isolate Russia” Bloomberg News, 10/19, <https://www.bloomberg.com/news/features/2023-10-19/climate-science-in-arctic-broken-as-us-europe-isolate-russia?embedded-checkout=true> //DH

Irina Panyushkina is a dendrochronologist — a scientist who studies tree-ring dating to understand past environmental conditions — at the University of Arizona. In early 2022 she was planning to do summer fieldwork in Siberia, for her research on the links between climate change, Russia’s freshwater systems and Arctic ice formation. Her work had already been delayed years by Covid-19.

Then Russia invaded Ukraine, and it slammed to a halt again.

Dmitry Nicolsky, a geophysicist at the University of Alaska at Fairbanks who researches thawing Arctic permafrost, managed to stay in touch with some of his Russia-based colleagues as the war started to unfold. But over time that contact stopped, and with it key information-sharing.

Florian Stammler, an anthropologist at the University of Lapland in Finland, was unable after the invasion to return to Russia’s Sakha republic in northeastern Siberia, where he’d long been measuring the impact of global warming on the nomadic, reindeer-herding Nenets people.

These projects represent a small fraction of the Arctic climate research that’s been derailed by the war in Ukraine. Studying the fast-warming top of the planet is crucial to efforts to mitigate global warming and understand its dynamics at lower latitudes. Arctic climate scientists tend to be a close-knit community, as normal professional rivalries are flattened by the borderless, existential threat of climate change.

But the war upended that status quo: Now geopolitics are a main determinant of whether scientific projects can move forward.

Most EU and NATO member countries have suspended or sharply limited funding for scholarly work involving Russia, a country that holds roughly half of the world’s Arctic territory. Sharing data is largely banned and the limited communication that’s still possible is nerve-wracking, as former scientific colleagues worry about jeopardizing each others’ careers or safety.

Finding ways to restart stalled science will be a recurring topic of conversation at a major Arctic conference in Iceland this week, where for the second year in a row, Russian scientists will not be present.

Asia will play an increasingly pivotal role in the Arctic, having heavily invested in polar science capabilities in recent years, said Ólafur Ragnar Grímsson, former president of Iceland and the conference’s chairperson, in an interview on the eve of the gathering. “Japan, Korea and China have modernized their research vessels with ice capability more than any other country in the world in the last five to 10 years,” Grimsson said.

A fundamental question for delegates to consider is whether “meaningful Arctic science” and “meaningful global climate science” can be done at all without access to data from Russia’s Arctic, Grímsson said.

Nicolsky’s research on permafrost has been supported by the National Science Foundation (NSF), one of the major American bodies that stopped funding new projects involving Russia under White House guidelines. The NSF also pulled out of most existing projects, unless they could be adjusted to focus on non-Russian parts of the region. (A European Commission decision had a similar impact on European funding.)

The project involved collecting temperature readings from more than 250 permafrost monitoring sites in Russia, Alaska and Canada, and mapping key changes. Arctic permafrost is estimated to hold 1,700 billion metric tons of frozen and thawing organic carbon, at least twice what’s already in the Earth’s atmosphere. As it thaws, that gas is released, accelerating warming, which in turn speeds up thawing in a dangerous cycle.

Most of the planet’s permafrost lies within Russia and Nicolsky was relying on Russian colleagues to collect that data. “We cannot remove this piece from the equation,” he says. “It’s like removing a couple of wheels from a car and trying to drive it home.”

He’s spent hours poring over legal documents, trying to find a clear path to continue working together. While the NSF did not withdraw funding, Nicolsky’s collaborators in Russia are unsure whether it’s safe to accept it, or even to communicate with US-based scientists.

Last year he was still able to receive some data out of Russia, “but this year it was just gridlock,” he says. “I spent countless meetings trying to facilitate collaboration with our Russian colleagues, to find different means, and it was falling apart from both ends, on the Russian side and on the US side.”

A fractured Arctic Council

It’s not just communication breakdowns. Nicolsky adds that the logistics system underpinning Arctic research — helping scientists ship equipment across borders and facilitating visas — is fundamentally “broken.”

Much of that kind of support had been provided by the Arctic Council, a pan-governmental group of Arctic nations formed in 1996 that includes Russia. A week after the invasion of Ukraine, it suspended all activities.

The Council had been a critically important body for bringing states and Indigenous groups together on Arctic issues, leading to legally binding agreements on matters such as scientific cooperation, search and rescue operations and marine pollution. Prior to the war in Ukraine, a Council working group was studying a possible pan-Arctic agreement to fight and prevent wildfires, of the kind that tore through Siberia and Canada in recent years.

That and other work has gradually resumed, though not at the normal speed or level, says Morten Hoglund, the Norwegian chair of the Council. Since his country assumed the rotating position from Russia in May, Hoglund has worked to find a way to unstick the body, which operates by consensus. A decision in August to allow member countries to communicate in writing, without having to meet, is an important step toward easing logjams and eventually allowing a few key projects to move forward. Still, the Council is not yet in a position to approve new projects, and even if they were, “there are layers of challenges, not only political but also practical,” that discourage collaboration with Russia, he says. “We have to be realistic.”

Progress will likely depend more on the willingness of the Council’s Western nations to engage with Russia than the other way around, says Jennifer Spence, a public policy expert with Harvard University’s Arctic Initiative. “It wasn’t Russia blocking anything, it was the seven other like-minded states,” she says of the Council’s paralysis. “In many ways, Russia has been ready to come to the table from day one and been pretty open about the fact that they wanted the Arctic Council to continue to function.”

#### Cutting off Russian data on permafrost biases climate models and make it impossible to adapt or mitigate

Malte Humpert, 2024 – journalist. ‘Lack of Russian data reduces understanding of climate change in the Arctic’, High North News, 2 Feb. 2024, <https://www.highnorthnews.com/en/lack-russian-data-reduces-understanding-climate-change-arctic> //DH

A new study published in the science journal Nature sheds new light on how Russia’s invasion of Ukraine hampers the collection of scientific data across the Arctic. The researchers looked at the world’s largest network of high-latitude research stations, called the International Network for Terrestrial Research and Monitoring in the Arctic (INTERACT), to determine what biases are introduced into the system when Russian data is excluded.

The impact of lacking Russian data over the past 24 months is especially significant as the country accounts for the majority of Arctic landmass and more than half of the Arctic Ocean’s coastline.

The scientists concluded that some biases are so significant that it will be hard to distinguish between shifts caused by climate change and those caused by the exclusion of Russian data.

With parts of the Arctic warming at four times the rate as the rest of the planet, the collection and assembly of ground-based observations across the region forms a key tool to assessing how the Arctic’s climate state is changing. Now data is predominantly coming from non-Russian parts of the Arctic.

The new study aims to determine how impactful the lack of Russian data is on the overall results. To quantify the effort the researchers looked at eight key variables, including annual mean air temperature, total precipitation, snow depth, soil moisture, vegetation biomass, soil carbon, net primary productivity and heterotrophic respiration.

The data comes from a network of 60 stations located above 59° N, of which 17 stations are located in Russia.

The researchers emphasized that even with all Russian stations included the network’s data contains a certain bias as the stations are “generally located in the slightly warmer and wetter parts of the Arctic” and in areas which generally experience deeper snowpacks and are thus not fully representative of the pan-Arctic ecosystem.

However, the loss of the Russian stations further erodes the representativeness across almost all ecosystem variables. This is especially true for Russia’s extensive taiga forests across Siberia, which are now fully excluded from the data set.

A dangerous blind spot

The researchers warn that this blind spot will severely hamper the tracking of the global implications of thawing permafrost across vast swaths of Russian Arctic lands.

Permafrost has been called a “ticking time bomb below our feet,” as it holds vast stores of CO₂ and methane, two powerful greenhouse gasses. As the soil warms it also has a detrimental effect on Arctic infrastructure.

The findings suggest that the variability and bias introduced by excluding the Russian stations is “of a similar magnitude as the shifts inflicted by almost 80 years of projected climate change.” It will thus be challenging to understand what shifts were the result of climate change and which are introduced by the lack of data.

The study concludes that “because of the geopolitical consequences of the Russian attack on Ukraine, the ability to both track and further project the development of the Arctic biome following climate-induced ecosystem change has deteriorated.”

This lack of understanding in turn will reduce the ability to design initiatives to help mitigate some of the negative consequences of climate change and will reduce the effectiveness of already existing programs.

The researchers call on the international community to “strive for establishing and improving a research infrastructure and standardized monitoring programmes representative of the entire Arctic.”

They conclude that “until that is implemented, the ability to support and advise local and global communities will decrease further due to the loss of Russian stations representing half of the Arctic’s landmass.”

#### Permafrost thaw creates positive feedbacks that cause runaway warming

Florian Vidal and Louna Saas, 2025 – \*Department of Social Sciences, UiT the Arctic University of Norway, Tromsø, Norway AND \*\*School of Advanced Studies in Social Sciences, Paris, France “Fragmented Arctic science: Permafrost as a salient feature in the divergence between geopolitical and chronopolitical perspectives” Polar Science, 4/24, <https://www.sciencedirect.com/science/article/pii/S1873965225000441> //DH

Over the past four decades, the issue of climate change has just grown to encompass interconnected and systemic pressure that exert systemic pressures on human societies (Bauer, 2011; Ripple et al., 2023). From freshwater scarcity to extreme weather events, the current shift in the Earth’s climate regime indicates that we are entering a period of instability as the Holocene equilibrium is no longer consistent due to long-standing anthropogenic perturbations (Lawrence et al., 2024). Therefore, climate change is transforming from a scientific concern to a global security issue that must be addressed on an institutional, ethical, and legal basis (Goldstein, 2016). As we move out of a relatively stable planetary regime, our primary concern as a collective species is to anticipate and predict the outcome of these changes and their magnitude. In other words, what seems extreme now may well become the normality of the planet of tomorrow. In this context, the cryosphere – consisting of Earth’s ice sheets, sea ice, permafrost, polar oceans, glaciers, and snow – is “ground zero for climate change” (ICCI, 2023). Its systemic destabilization as a result of continued global temperature rise indicates a dire vulnerability to climate regime disruption.

Over the course of the last five decades, the Arctic region has warmed nearly four times faster than the global average rate underlining the rapid change in the polar area, a phenomenon called Arctic amplification (Drüke et al., 2024). As such, the polar region has a specific centrality in the global climate system as it is home of several key tipping points (Armstrong McKay et al., 2022; Hansen et al., 2016; Lenton, 2012; Lenton et al., 2019). As defined by Rahmstorf (2024), a tipping point is “a point at which further development into a fundamentally different state becomes an unstoppable self-sustained process, driven by reinforcing feedback effects”. To sum up, the influence of the polar region is so critical that it may tilt the Earth’s climate regime. Among the tipping points identified, permafrost thaw is of particular concern because of its potential for adverse local impacts and its role as a catalyst for broader, long-term feedbacks (Nitzbon et al., 2024). Given its potential role in the ongoing climate crisis and the formation of positive feedback loops, permafrost thawing is a strategic issue for the international community. Within this paradigm, the scientific community plays an instrumental role in implementing a new international security regime by acting as an operational stakeholder in the monitoring and analysis of the biophysical dynamics in the polar region.

3.1. The case of permafrost

Due to the rapid anthropogenic climate change, one of the major threats to the stability of the Earth’s climate regime is related to the thawing permafrost. Permafrost covers ∼25% of the land surface of the Northern Hemisphere, partly mapped in the Arctic (i.e., 13–18 million km2). In total, the permafrost stores an estimated 1100–1500 billion metric tons of soil organic carbon, which upon thaw can be decomposed into carbon dioxide (CO2), methane (CH4) and nitrous oxide (N2O) – all of them greenhouse gases (GHG) (Hugelius et al., 2014). In scientific terms, permafrost is defined by the temperature at which the ground remains at or below 0 C degree for at least two consecutive years. As Westerveld et al. (2023) remind us, “as long as permafrost stays frozen, the organic carbon within it will remain locked in the ground”. However, an accelerating warming climate threatens to release this stored carbon (C) massively into the atmosphere through widespread microbial decomposition. While the Arctic permafrost soils are among the largest reservoirs on Earth, the long-term risk lies in the possibility that the polar region could become a C pool source – rather than of a C sink – resulting in a positive climate feedback mechanism, known as the permafrost carbon feedback (PCF) (Miner et al., 2022; Schuur et al., 2015; See et al., 2024). With respect to the Arctic tundra, conversion to a C pool source may already be occurring, signaling a shift in the permafrost regime (Natali et al., 2024). In recent decades, changes in the thickness of the active layer of permafrost (i.e., the seasonally unfrozen surface layer) have been observed, suggesting that the current rate of thawing is faster than predicted by models (Turetsky et al., 2019; Westerveld et al., 2023). Projections of continued temperature increase under IPCC Shared Socioeconomic Pathways (SSPs, replacing RCP scenarios) indicate further warming of permafrost, while the scientific community discusses the potential for non-linear system behavior. In such a scenario, this process could in turn accelerate PCF with potentially higher GHG emissions being released to the atmosphere (Biskaborn et al., 2019; Nitzbon et al., 2024; Schaefer et al., 2014). According to future projections, estimated GHG emissions from terrestrial permafrost thaw would range from 100 to 240 billion tons of C by 2100 based on different climate change scenarios (Meredith et al., 2019). However, there is a lack of clarity regarding “the timing, magnitude and the relative roles of CO2 versus CH4 as feedback processes” (Masson-Delmotte et al., 2021), and large uncertainties notably in respect to abrupt thaw events and biological interactions co-occurring with warming (see for instance Keuper et al., 2020). Given that the release of C emissions into the atmosphere has a cumulative effect, the resulting change in the chemical composition of the atmosphere is projected to persist for several centuries. Furthermore, CH4 is a short-lived but potent greenhouse gas that could accelerate further positive climate feedback loops, which could eventually lead to a runaway feedback effect. In this context, scientific collaboration to monitor terrestrial permafrost in the Arctic highlights the critical long-term security implications.

For the Russian territory, this is a critical area as approximately 65% of its soils consist of permafrost. In particular, the western Russian Arctic permafrost is degrading most rapidly compared to the rest of the polar region, as shown by long-term terrestrial permafrost monitoring records from the mid-1970s to the early 2020s (Vasiliev et al., 2020; Westerveld et al., 2023). Based on monitoring evidence, Western Siberian peatlands, a major C stock, and the Northern European region of Russia have experienced large changes in the active layer thickness, which “increased by as much as 0.4 m between 2009 and 2019” (Westerveld et al., 2023).

Moreover, 85% of the Arctic’s large permafrost communities (i.e., defined as those with at least 5000 inhabitants) are situated in Russia (Westerveld et al., 2023). The degradation of terrestrial permafrost, therefore, presents particular challenges to human security. At the socio-economic level, the Russian Arctic is characterized by a more extensive and dense infrastructure, including roads, railways and urban infrastructure consisting of significant large cities (e.g., Norilsk, Vorkuta, and Yakutsk). These infrastructures are threatened by thermokarst processes, which are ground subsidence caused by thawing permafrost. The bulk of the aging infrastructure was constructed during the Soviet era. However, the country is currently experiencing unprecedented impacts and financial costs related to its infrastructure as a result of large-scale permafrost degradation throughout this century. According to Streletskiy et al. (2023), the financial burden of the permafrost degradation on all types of infrastructure in the Russian Arctic is estimated to range between USD 97.5 billion (the lowest estimated figure) and USD 152.8 billion (the highest estimated figure) over the coming decades. With respect to public health, the thawing of permafrost may result in the release of pathogens that have been trapped within the soil for an extended period, potentially exposing human communities that have settled in these areas. The significant reservoir of pathogens and their range (i.e., bacteria, fungi, and viruses) raises the possibility of their activation as permafrost thaws under changing Arctic conditions, thereby increasing the prospect of disease emergence (Christie, 2021; Miner et al., 2021; Wu et al., 2022). In 2016, an outbreak of the anthrax disease in the Siberian Arctic spread across the region due to increasing temperatures (Stella et al., 2020). This event occurred after a severe heat wave thawed an infected frozen reindeer carcass, highlighting the increasing risk of contaminant release to water quality, wildlife, and human health from permafrost thaw (Langer et al., 2023).

In the long term, permafrost thaw represents a significant and alarming threat to Russia’s political and socio-economic stability, as it would have the potential to jeopardize the country’s public policy strategy in the Arctic, which has been planned over the past decades. Such a scenario would have implications for Russia’s future governance in terms of national security, ultimately impacting the international security regime. Given the complexity of permafrost monitoring, scientific cooperation plays an important role in further advancing knowledge and providing a better projection of future changes in the stability of terrestrial permafrost and thermokarst processes in the Arctic region and potential global PCF impacts.

#### Runaway warming from permafrost thaw risks global ecological collapse and extinction

Michael Huft, 2023 –PhD in Biology from the University of Michigan, JD from Northwestern, BS in Physics from Notre Dame, editor of the Great Lakes Botanist “BOOK REVIEW” THE GREAT LAKES BOTANIST, <https://journals.publishing.umich.edu/glbot/article/id/5016/> //DH

Though small or local ecosystems may collapse from time to time from a variety of causes, scientists are becoming aware of the possibility of large-scale, or even global, ecosystem collapse as a consequence of global warming, particularly under a Plan A scenario. Perhaps the most obvious such event would be the collapse of the oceanic ecosystem resulting from ocean acidification, which would destroy coral reefs and prevent the formation of the calcium skeletons or exoskeletons of many marine animals, but most pertinently of foraminifera, which are the base of many oceanic food chains. Attention has also focused on the possibility of more extensive collapse on land. A 2004 study (Thomas et al. 2004) found that under a business as usual scenario, 15–37 percent of land animal and plant species would be committed to extinction by 2050. Griffin notes that a 2007 study concluded that the plankton, edible fish, bees, and topsoil, all of them essential to human survival, are in severe danger and their loss must be averted. A comparative study of historical extinction rates with those of today concluded that species are now disappearing at a rate 1,000 times that of the past and that we are facing a major extinction crisis comparable to the end of Cretaceous extinction event that spelled the end of the dinosaurs and large numbers of other species (Pimm et al. 2014).

An important study discussed by Griffin attempts to recognize planetary boundaries that must be observed to prevent global ecosystem collapse (Rockström et al. 2009). The idea is that as the earth transitions from the Holocene (the geological epoch that began following the latest glacial era, about 10,000 years ago) to the Anthropocene (a proposed geological epoch that began at the dawn of the industrial revolution or later in recognition of the substantial human im- pact on the earth’s geology and biosphere, including climate change), many of the conditions that permit the maintenance of the global ecosystem are being altered beyond the bounds that held sway during the Holocene. The authors ask what the non-negotiable global preconditions are that we need to respect in order to avoid catastrophic environmental change on a planetary scale. They refer to the preconditions as thresholds—a concept that is similar to the tipping points we have already discussed with respect to irreversible changes brought on by climate change. Transgressing one or more of these thresholds could lead to an abrupt change in the global ecosystem. Since we have no precise knowledge of these thresholds, in particular when, or under what conditions, they would be triggered, the authors call for study of the dynamics of these thresholds and the associated feedbacks on a continental and global scale. They suggest that we agree on a set of boundaries within which we can expect to operate safely. At one point it was assumed that a 4°C rise in global temperatures would provide safety for global ecosystems, but most scientists later came to believe that no more than a 2°C rise will guarantee safety. However, Rockström et al. (2009) proposed that a safe boundary would be an increase of no more than 1.5°C. They recognize nine planetary boundaries, of which three have already been passed. These include atmospheric CO2 concentration and loss of biodiversity. They urge that we do what can be done to repair or mitigate the boundaries that have been passed and also to ensure that no further boundaries are passed.

Griffin agrees with numerous scientists that the release of methane from permafrost in the Arctic poses the greatest threat of collapse of the global ecosystem. Permafrost is the expanse of soils in the Arctic that has been frozen since the most recent glacial period. It contains vast amounts of carbon from dead animals and plants, primarily in the form of methane. It is estimated that the carbon in the permafrost constitutes half of all the carbon stored in the earth’s soils. If it were all to be released, it would constitute four or five times all the carbon that has been released by human activity since 1850. The concern is heightened because the Arctic is warming twice as fast as the rest of the planet, which makes thawing of the permafrost, and the consequent release of methane, even more likely. This is particularly so, since most of the carbon is in the top three meters of the permafrost. If the permafrost is on dry land, the carbon will be broken down by oxygen-breathing bacteria and released as CO2, whereas if it is below a wetland, it will be released as methane, which is a far more potent greenhouse gas than CO2. It was once thought that the release of methane from permafrost was a minor problem that would take place only in the distant future. But there is now strong evidence that the release is happening now. In recent years, the shallow waters off the Arctic coast of eastern Siberia on what is known as the Arctic shelf is saturated with methane, which was later shown to be arising from underwater permafrost. If business as usual continues, the release of even a portion of the methane stored in the shelf is released, that could trigger substantial abrupt warming. Because of the increased warming, the methane release will become self-sustaining as a positive feedback loop, leading to runaway warming and ecological collapse. In 2013, it was discovered that permafrost in the Antarctic region is also subject to warming and release of carbon.

#### \*Permafrost thaw risks natural and engineered pandemics. Research cooperation increases early detection and containment.

Alec Christie, 2021 - Department of Zoology, University of Cambridge, Biosecurity Research Initiative at St Catherine’s (BioRISC) “Blast from the Past: Pathogen Release from Thawing Permafrost could lead to Future Pandemics” Cambridge Journal of Science & Policy, Vol 2 (2021), Issue 2, <https://www.repository.cam.ac.uk/bitstreams/e86e7e5e-def6-4d0c-a403-c9e40c43ab67/download> //DH

Whilst the current likelihood of the release of a contagious pathogen from permafrost is likely to be low at present, the current Covid-19 pandemic demonstrates the need to take the risk of such an occurrence seriously. Increasing levels of human contact with thawing permafrost directly driven by climate change, as well as increased oil, gas, and mineral extraction in the Arctic circle, will only increase the chance of pathogens being released from thawing permafrost. In particular, the evidence suggests that the likelihood of localised outbreaks due to spore-driven pathogens, that cause diseases such as Anthrax, is at least moderate and should be taken extremely seriously.

However, with increased preparedness, monitoring, and surveillance, the threat from such pathogens could be minimised to a great extent. For example, pre-emptive monitoring and surveillance to detect Anthrax outbreaks should be targeted towards the 13,885 cattle burial grounds scattered across northern Russia [6, 28], whilst local and historical records can be used to identify more high-risk sites in other parts of the Arctic Circle (e.g., in Scandinavia and North America). The same approach is also likely to be useful for identifying old sites of mass graves for the bubonic plague and Spanish flu using historical records. Early monitoring and surveillance in high-risk areas could catch dangerous pathogens before they become a serious problem.

Such monitoring and surveillance should also consider human exploitation of the Arctic Circle for oil, gas, and mineral extraction, which may lead to novel pathogen exposure events. Organisations need to acknowledge the biosecurity risks involved in undertaking these activities and ensure adherence to strict biosecurity protocols, so that risk is minimised for humans in contact with permafrost soils. Ultimately, to ensure organisations are held accountable for their actions, local and international laws may need to be considered to regulate activities in the Arctic Circle from a biosecurity perspective [40–42].

Effective surveillance and monitoring for potential outbreaks will require strong cooperation between local and international public health organisations (such as the World Health Organisation (WHO)), and between governments of countries where most of the Northern Hemisphere’s permafrost exists (i.e., the USA, Canada, Russia, Norway, Finland, and Sweden [40–42]). Whilst such cooperation may be challenging, the consequences of being unprepared to contain and respond to developing outbreaks of novel pathogens from permafrost could represent a serious threat for the global economy and society, as demonstrated by Covid- 19. Therefore, it is in the mutual interests of all nations to cooperate in the monitoring and surveillance of novel pathogen outbreaks from permafrost.

It is also important to acknowledge that pathogens have been previously used to manufacture and test biological weapons (mostly by governments in relation to Anthrax-causing B.anthracis pre- and post-World War II [43], but also more recently in a 2001 attack via letters in the US postal system [44]). Therefore, there is clearly potential for groups or organisations with malicious intent to extract and modify microorganisms frozen in permafrost for dangerous agendas and purposes [45–50], making strong international cooperation and leadership from the WHO even more important in this regard.

Ultimately, tackling the climate crisis and limiting global warming according to the Paris Agreement will help to address the major driver behind permafrost thawing and potential release of pathogens. The risk posed by thawing permafrost, on top of the myriad of threats already posed by climate change, should inspire all nations to take their commitments to reduce their greenhouse gas emissions seriously.

Conclusion

The more that human civilisation extracts and exposes permafrost directly or indirectly through physical exploitation or climate change, the greater the likelihood that novel pathogens may be released and cause death and disease in human, animal and plant populations. Underestimating the threat of novel pathogens from unusual sources has been shown to carry serious consequences for all human civilisation, as demonstrated by the Covid-19 pandemic. Although the likelihood of a pandemic caused by pathogens in permafrost is relatively low compared to zoonoses (e.g., Covid-19), the risks posed by permafrost-related pathogens must be taken seriously. Creating and implementing appropriate biosecurity management plans in areas of greatest risk could save many lives and livelihoods. The effectiveness of these plans at controlling any outbreaks from permafrost will ultimately depend on strong international cooperation and regulation by public health organisations and governments.

#### \*Emerging pandemics risk extinction – but early, rapid response contains the impact

Jaime M. Yassif, et al, 2023 - PhD, is Vice President, Nuclear Threat Initiative, Washington, DC. “Guarding Against Catastrophic Biological Risks: Preventing State Biological Weapon Development and Use by Shaping Intentions” Health Secur. July/August 2023; 21(4): 258–265. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10357110/> //DH

The devastating impact of COVID-19 has highlighted global vulnerabilities to high-consequence biological events. The international community was woefully unprepared for a pandemic that has led to millions of deaths and trillions of dollars in economic losses, and has upended daily life. However, notwithstanding the severe damage caused by COVID-19, it should be viewed as a warning shot.1 It will not be the last pandemic humanity faces, and the next high-consequence biological event could be as destructive or substantially worse.

We define global catastrophic biological risks (GCBRs) as biological events of tremendous scale that could cause severe damage to human civilization, potentially jeopardizing its long-term survival.2 The Johns Hopkins Center for Health Security has also developed a working definition of GCBRs,3 and this term is part of a broader discussion about global catastrophic risks that could arise from a variety of sources, including nuclear war, anthropogenic climate change, and advanced artificial intelligence that has not been sufficiently safeguarded.4,5 GCBRs could be caused by a naturally emerging infectious disease outbreak, an accidental release of a pathogen, or a deliberate attack. Naturally emerging infectious disease outbreaks that can grow into pandemics are likely to increase in frequency due to urbanization, globalization, and environmental degradation, and the world faces an increasing risk of high-consequence biological events resulting from accidental or deliberate misuse of the tools of modern bioscience and biotechnology.6-8 Not all outbreaks or global pandemics will grow to the scale of a GCBR as we define it in this article and as others have defined global catastrophic risks more broadly, because the threshold for this type of event is extremely high.

Although COVID-19 does not rise to the level of a GCBR-scale event, it has demonstrated that a biological event can have a devastating global impact, and it should serve as a warning to global leaders that the world needs much more robust protections against high-consequence biological events that could emerge in the future and be substantially worse.

In our view, human-caused biological events involving the accidental or deliberate misuse of an engineered pathogen are more likely to lead to a GCBR-scale event than a naturally emerging pandemic.9 Scientists have the capacity to deliberately or inadvertently engineer pathogens that are more virulent and transmissible than what nature creates by chance, and the upper limit of damage that could be caused by a human-engineered biological event is unknown.10-12 Prevention, early detection, and rapid response are all crucial for guarding against GCBR-scale events. However, in this article, we focus on effective strategies for preventing biological events that could become GCBRs, specifically by disincentivizing development and use of biological weapons by states and other powerful actors.

#### Stronger permafrost research creates better climate models and policies for adaptation

Dr. Susan M. Natali, 2022 - Arctic Program Director and Senior Scientist - Woodwell Climate Research Center. House Committee on Science, Space, and Technology “Amplifying the Arctic: Strengthening Science to Respond to a Rapidly Changing Arctic” 9/20 https://republicans-science.house.gov/\_cache/files/4/5/459dd286-e1eb-4579-83b4-e9ab856a9370/369C4C8680EC11D3C2B743EFEF758E37509D258F576226F68A9DBD5D067C301F.2022-09-20-natali-testimony.pdf //DH

These troubling projections of future carbon release due to permafrost thaw are very likely an underestimate of actual future emissions because they do not include critical disturbance processes that may double the magnitude of the permafrost carbon feedback (Turetsky et al. 2020, Natali et al. 2021). Models of permafrost carbon emissions typically depict permafrost thaw as a slow top-down process in which elevated air temperatures gradually increase heat transfer into the soil and thaw permafrost (e.g., at a rate of <centimeter per year). However, the rate of permafrost thaw can be exacerbated by abrupt, nonlinear thawing that causes extensive ground collapse in areas with high ground ice. Abrupt thaw events, while often taking place on comparatively small spatial scales, can rapidly expose deeper permafrost layers, and therefore a larger volume of stored carbon, over rapid timescales (e.g., meters per year or quicker) (Natali et al., 2021). Abrupt thaw events can be triggered by extreme weather, such as the recent heat waves in Siberia and Alaska. More frequent and severe Arctic and boreal wildfires further catalyze the emissions feedback loop from the permafrost region by directly releasing large amounts of carbon during combustion, and by expediting permafrost thaw (Natali et al., 2021). All of these processes are accelerating due to climate change, and the scientific community is increasingly recognizing the amplifying effect that these under-represented mechanisms of carbon loss from the permafrost region have on the magnitude and timescale of resulting emissions (Turetsky et al. 2020).

Unfortunately, only a small minority of global-scale climate models incorporate permafrost thaw, and none of these represent processes other than gradual thaw. Models used to inform nationally determined contributions under the Paris Agreement, for example, failed to account for key processes that can greatly accelerate permafrost thaw rates and carbon emissions, notably abrupt thaw and wildfires in Arctic regions (Baillargeon et al., 2021). For almost a decade, the IPCC has reported with high confidence the likelihood of a permafrost carbon feedback on global climate. Yet, the IPCC reports low confidence when it comes to assessing the timing, magnitude, and form (carbon dioxide or methane) of this feedback. The latest Sixth Assessment Report (AR6) made a significant step forward as it was the first time that permafrost carbon was included in the Earth System Models that informed the IPCC report (Coupled Model Intercomparison Project Phase 6, CMIP6) (Ciais et al., 2013; IPCC 2018; Canadell et al., 2021) (IPCC, 2021). However, just two of 11 ESMs in CMIP6 included permafrost and neither of these models represented abrupt thaw, wildfire-mediated thaw, or the release of carbon from below-ground combustion during wildfire (Canadell et al 2021, Natali et al., 2022).

Improving certainty of permafrost thaw for more effective mitigation and adaptation policies.

While rapid progress is being made by the scientific community in this area, the sparse nature of on-the-ground measurements combined with the scale and complexity of Arctic regions and limitations on funding relative to the need for improving permafrost representation in models remain a considerable challenge to progress (Natali et al., 2022). This ongoing scientific challenge highlights the need to more effectively and expeditiously communicate the science of permafrost thaw to key decision-makers and for decision-makers to then integrate this science into ambitious climate policy.

Advancing Arctic carbon monitoring and modeling is necessary to truly understand the magnitude and timescale of permafrost thaw emissions—and respond accordingly. Permafrost emissions could take up as much as 40% of the remaining carbon budget to stay below 2°C warming (Gasser et al., 2018). That fraction is even higher if the goal is limiting warming to 1.5°C—the threshold at which we can expect to trigger a critical tipping point for permafrost, ice sheets, and coral reefs (Armstrong McKay, et al., 2022). Resolving scientific uncertainty surrounding permafrost thaw is therefore critical for ensuring the accuracy of the United States’ carbon budget and national ambition. The potential harm from neglecting permafrost thaw cannot be overstated. Even the most alarming projections of 3-41 GtCO₂ per 1°C of warming by 2100 likely underestimate the potential of permafrost carbon emissions (Baillargeon & Natali, 2021; Natali et al., 2021). While the Administration has committed to reducing emissions by 50% from 2005 levels by 2030, this goal will likely be insufficient if the carbon budget does not account for permafrost thaw.

Resolving scientific uncertainty is also a prerequisite to informing adaptation policies that better respond to the urgent and severe impacts of permafrost thaw on Arctic communities. Federal emergency response and disaster relief programs, including those under the 1988 Robert T. Stafford Disaster Relief and Emergency Assistance Act (“Stafford Act”), often do not consider slow-onset impacts of permafrost thaw, and state, local, and tribal governments are simply not equipped to the hazards of permafrost thaw without federal support (Bronen, 2021). As communities realize the limits of their capacity to adapt to climate change in their current locations, some are considering relocation as the only viable long-term option. The U.S. Government Accountability Office (GAO) recently concluded that more than 70 out of over 200 Alaskan Native villages face significant threats from erosion, flooding, or thawing permafrost (GAO, 2022)–nearly a decade after the GAO identified 31 Alaskan villages in such a position (GAO, 2009). Despite efforts by three Alaska Native communities to fully relocate, to date, no village has successfully completed this process. Instead, communities are facing insurmountable obstacles, citing a lack of governance framework, dedicated federal funding, and government support to facilitate relocation efforts (Bronen and Chapin, 2013; Bronen 2021).

#### Adaptation measures slow the rate of permafrost thaw and limit the impact

Walter Leal Filho, et al, 2023 - Department of Natural Sciences, Manchester Metropolitan University (UK) “On the (melting) rocks: Climate change and the global issue of permafrost depletion” Science of The Total Environment Volume 903, 10 December 2023, Science Direct, accessed via University of Michigan //DH

1. Introduction

Permafrost is essential in the Arctic region as it plays a significant role in undergirding the ground, thus supporting infrastructure and countering erosion, which can be globally impactful (Beer et al., 2020; Larsen et al., 2021). In addition, permafrost is vital in storing carbon. However, the Arctic has experienced increased temperatures in the past few decades, driving permafrost to thaw and releasing greenhouse gases (GHG) into the atmosphere (Schuur et al., 2022). The thawing of permafrost has large-scale environmental implications and impacts the economy and culture of coastal communities and beyond (Beer et al., 2020; Intergovernmental Panel on Climate Change (IPCC), 2022; Lamoureux and Lafreniere, 2018). Fig. 1, produced by the European Space Agency's (ESA) Climate Change Initiative (CCI) permafrost project (Obu et al., 2021), shows the spatial distribution of permafrost active layer thickness across the northern hemisphere.

The intensive, ubiquitous burning of fossil fuels since the mid-1800s has led GHGs to spike in the atmosphere, which is responsible for the permafrost melt in various areas, including the Arctic (Friedlingstein et al., 2019; Schuur, 2016). Between 2007 and 2016, for instance, the ground temperature near the depth of zero annual amplitude – i.e., the depth at which annual temperature fluctuations are dampened to less than 0.1 °C – in the continuous permafrost zone increased by 0.39 ± 0.15 °C (Biskaborn et al., 2019).

Due to decreasing ice cover over most Arctic regions, the ‘snow-ice albedo feedback’ has been affected. As a result, less solar radiation is reflected, and more heat is absorbed on the surface, causing further warming and thus increasing permafrost thawing (Riihelä et al., 2021).

Permafrost contains carbon-based organic matter, consumed by microorganisms whenever it thaws, releasing methane (CH4) and other gases (Masyagina and Menyailo, 2020), which, in turn, impacts microbial communities (Lamoureux and Lafreniere, 2018). Moreover, the current permafrost thaw will likely intensify under this century's projected global warming and the release of substantial amounts of GHG, exacerbating the problem (Schuur et al., 2015). Since soil respiration responds to warming more strongly in colder climates than in warmer ones, these emissions are of particular concern (Carey et al., 2016), resulting in increased CO2 emissions and CH4 (Grant et al., 2019), thus intensifying climate change.

Moreover, wildfires' increasing occurrence and broadening (Kasischke and Turetsky, 2006) are powerful yet underestimated stressors in fragile permafrost contexts (Gibson et al., 2018).

2. The impacts of permafrost thaw

Continuous and discontinuous permafrost covers about 15 % of the land surface in the northern hemisphere (Smith et al., 2022; Obu, 2021). This figure highlights the urgency of addressing climate change and protecting permafrost. Retreating and spatial shifting in the distribution of frozen ground alters the forest cover, hydrology, species habitats and human life in the areas affected (Czerniawska and Chlachula, 2020). The thawing of permafrost not only exerts consequences on terrain, ecosystems and infrastructure but may also delay or impair international efforts concerning sustainable development (Hjort et al., 2022; Leal Filho et al., 2022, Leal Filho et al., 2023) and CO2 abatement (Schuur et al., 2022; Turetsky et al., 2019), influencing the various climate scenarios (Intergovernmental Panel on Climate Change (IPCC), 2022). Fig. 2 captures some of the multi-faceted, diverse impacts of permafrost depletion.

The anatomy of the rock and sub-soil structure involved in how permafrost unfolds and the spatial extents, geometry, and shallow-seated mechanism of how the affected terrain ruptures due to thawing (Smith et al., 2022) unveils a peculiar shallow behaviour. For instance, thawing has waned the concrete integrity of the ground/foundations where infrastructure has been built over the decades (Hjort et al., 2022; Langer et al., 2023). Threats to existing infrastructure related to permafrost thawing include active layer thickenings and thaw-related hazards, such as thermokarst and mass wasting (Schuur, 2016; Schuur et al., 2015).

The risk of permafrost-related degradation will likely increase significantly by 2050, with infrastructural impairment already documented in swaths of Russian territory, where many buildings and legacy fuel storage facilities are experiencing damage and whose leakage (e.g., of old Soviet-era fuel storage tank ruptures) may pose a further threat to the environment as well (Langer et al., 2023; Wrigley, 2023).

For example, in the Qinghai-Tibet Plateau, 30 % of roads were reported to have been affected (Hjort et al., 2022). In addition, the risk of structural damage and leakage of hazardous waste is projected to be very significant over the following decades, whatever the reference climate scenario (Langer et al., 2023).

Apart from causing terrain rupture and ensuing damage to the built environment, permafrost thawing has been driving vast alterations to the natural landscapes of the northern regions since the 1960s (Turetsky et al., 2019). In high-altitude areas hosting glaciers, rapid transformation due to permafrost degradation has led to the onset of new lakes and drainage networks, with ensuing reduced slope stability that may further trigger flooding due to mobilised deposits and water mass (Haeberli et al., 2017), ultimately adding potential strain to infrastructure and human life in the exposed regions.

The thawing of permafrost also releases chemical, biological and radioactive components that have been locked under various forms in both the cryosphere and the geosphere over the 103–105 yr span, resulting in vast disruptions of ecosystems, altered wildlife populations and prospective endangerment to the human health (Intergovernmental Panel on Climate Change (IPCC), 2022; Miner et al., 2021).

Permafrost thaws at different rates (Intergovernmental Panel on Climate Change (IPCC), 2022), and slower thawing tends to affect the shallower, more recently frozen layers of soil, rock and ice, penetrating the deeper sections of permafrost. However, abrupt thawing, capable of dismantling whole rock and soil sections, affects older, deeper layers (Turetsky et al., 2019). While the thawing phase depends on temperature and precipitation changes and may occur gradually, the rate increases as temperatures are consistently higher – all the more in Arctic regions – and vast areas and volumes of permafrost can be lost per decade (Turetsky et al., 2020).

3. Moving forward: addressing an issue more global than commonly perceived

The rapid depletion of permafrost in the Arctic threatens efforts to reduce global warming. In addition, it heightens climate change in other regions (Intergovernmental Panel on Climate Change (IPCC), 2022; Masyagina and Menyailo, 2020) to the extent that may elude – both in space and time – the assumed geographic boundaries of cold permafrost regions “up North”. Despite ample literature, this has contributed to a somewhat slow and sparse perception throughout societies of the phenomenon, its long-time onset, and its cascading spatial effects (Intergovernmental Panel on Climate Change (IPCC), 2022).

Abrupt thawing occurring through extreme temperature fluctuations can expose older permafrost horizons more rapidly than earlier estimated. Depending on local conditions and the rock and soil fabric involved, such a phenomenon may initiate the release of compounds from deeper layers much faster than expected (Turetsky et al., 2019). There are also concerns that permafrost degradation will eventually expose ancient burial sites, thus possibly reviving vectors that, under present-day temperature conditions, could spread deadly infections or allow the re-emergence of pathogens, thus potentially endangering human health (Huber et al., 2020). Therefore, actionable, effective solutions are needed to slow down the rate at which permafrost thawing grows – including the engagement of the public discourse.

Some of the measures which may help to handle permafrost thawing are:

i) Installing permafrost insulation to shield permafrost from the heat of the sun and other environmental factors affecting the terrain's integrity. This could include insulation boards and thermal blankets around buildings, pipelines, and other structures built on permafrost.

ii) Planting more cover crops can help to keep permafrost cool and stabilise the ground. Perennial grasses and trees can provide shade, which can help reduce the permafrost thaw rate. In addition, these plants may help to keep the soil moist and add organic matter to help improve the soil quality.

iii) Facilitating groundwater recharge can help keep permafrost cool and reduce the thaw rate. This can be attained by constructing rainwater harvesting systems and using porous pavings to increase the amount of rainwater stored in the ground.

iv) Improving snow cover can help keep permafrost cool and reduce the thaw rate. This can be done by planting trees and shrubs to create shade or using snow fences to accumulate snow and reduce the speed at which it melts.

Permafrost melting is an urgent environmental issue, as it can contribute to global warming and impact the environment in a diverse range of issues across vast regions. Reducing GHG emissions to address this issue, a critical driver of permafrost melting, is crucial. It is also essential to understand the local impacts of permafrost melting, such as increased flooding, erosion, and water and soil contamination. In some areas, protecting infrastructure, ecosystems, and communities from the effects of permafrost melting becomes necessary.

In summary, the depletion of permafrost is a serious problem because it has several negative impacts. For example, it can:

• Destabilise infrastructure, such as roads and buildings.

• Increase the risk of flooding and landslides.

• Release CH4, a potent GHG, into the atmosphere.

• Disrupt ecosystems and food webs.

Therefore, GHG emissions need to be reduced to slow the thawing of permafrost and reduce its negative impacts.

Finally, it is vital to monitor permafrost more intensively to detect early signs of melting and ensure appropriate measures can be taken promptly.

#### Trump has incentives to support adaptation

Evan Bloom, 2025 - Senior Advisor, Centre for the Ocean and the Arctic, UiT – The Arctic University of Norway, and former U.S. diplomat “US Policies in the Arctic Are Changing but the Extent Remains to Be Seen” High North News, 4/10, <https://www.highnorthnews.com/en/us-policies-arctic-are-changing-extent-remains-be-seen> //DH

In 2019, under the last Trump Administration, the U.S. vetoed the Council’s ministerial declaration at Rovaniemi, primarily due to references it contained related to climate change.

However, the U.S. did not go further and prevent work within the Council’s technical working groups related to climate. Today, the Administration will face a similar choice.

With other countries (Russia aside) wanting the Council to continue to focus on its traditional core efforts to promote science-based research and policies related to environment and climate change, will the U.S. allow that work to continue?

Or this time, would it block those efforts that are likely to be sought by the Nordics and Canada?

In Arctic matters, in particular within the State of Alaska, outreach to and inclusion of views of Indigenous Peoples play an important role in policy development and implementation.

Will the Trump Administration accommodate Indigenous interests, or will these somehow be deemed akin to promoting social equity and inclusion policies that the Administration opposes in other contexts?

The current Administration will no doubt be unwilling to support climate research in the Arctic, but that isn’t quite the same as denying that the climate is changing and requires local adaptation.

Perhaps the Administration as it develops its policies will acknowledge the reality of permafrost melt and its impact on infrastructure.

Even if the release of carbon emissions isn’t a focus of its concern, the federal government may acknowledge the need to address collapsing roads and buildings in Alaska.

Thus, Arctic States will need to have some patience as various American policies becoming clearer. And in the meantime, they can task their diplomats with expressing to the U.S. their thoughts on some of these topics in the hope of influencing the formulation of U.S. positions.

### 1ac – Arctic Diplomacy Advantage

#### Contention 2 is Arctic Diplomacy

#### Cutting off scientific cooperation with Russia fractured the Arctic Council. The collapse of Arctic governance combined with Russian conventional vulnerability has increased nuclear sabre rattling and the risk of miscalculation and war

Mathieu Boulegue and Duncan Depledge, 2024 - \*Global Fellow at the Wilson Center's Polar Institute, a Consulting Fellow at Chatham House and a Non-resident Senior Fellow at CEPA, AND \*\*Senior Lecturer in Geopolitics and Security at Loughborough University. “The Face-off in a Fragmented Arctic: Who Will Blink First?” RUSI, 5/24,

<https://www.rusi.org/explore-our-research/publications/commentary/face-fragmented-arctic-who-will-blink-first> //DH

With Russia’s war against Ukraine well into its third year, fears of a potential ‘spillover’ into the Arctic remain high. With Sweden and Finland having recently joined NATO, three things become clear. First, there is now de facto ‘more NATO’ in the Arctic. Second, Russia’s fears of strategic encirclement are not going away any time soon. Third, the dividing line between Russia and the West in the Arctic has never been starker – there is now what can be argued to be a ‘NATO 7 vs Russia’ in the region.

The implications for Arctic cooperation are significant. ‘Arctic exceptionalism’ – the idea that the challenges facing the region encouraged cooperation and not geostrategic competition – which for so long was regarded as the guiding light for relations between the eight Arctic states (Canada, Denmark, Finland, Iceland, Norway, Russia, Sweden and the US), has all but dissipated. The principle of ‘circumpolarity’ (the idea that the Arctic 8 should collectively determine the region’s future) has also been eroded. The impact on the Permanent Participants (representing Arctic indigenous peoples) has been largely overlooked.

The challenges faced by the Arctic Council (the premier forum for regional cooperation) over the past two years are emblematic of the current state of circumpolar affairs. Within weeks of Russia’s full-scale invasion of Ukraine in 2022, seven of the eight member states (Canada, Denmark, Iceland, Finland, Norway, Sweden and the US) jointly ‘paused’ their involvement in the Council and its affiliated bodies. Around a third of the Council’s 130 projects were reportedly put on hold, with new projects blocked and existing projects unable to be renewed.

Gradually, the ‘Arctic 7’ have found ways to resume activities with minimal participation from Russia. The handover of the chairship from Russia to Norway in 2023 proceeded smoothly. In February 2024, Norway announced that the Council’s Working Groups, where the organisation’s main work takes place, would be resumed with the participation of all states, including Russia – but only in a virtual format.

Yet despite these steps to restore critical functions, there is still good reason to be concerned by the Arctic Council’s future prospects. Even as plans for the Working Groups to meet virtually were being drawn up, Moscow announced that it would suspend its annual payments to the Arctic Council until the organisation resumes its work in full. Since 2022, Russia has restricted access to scientific data that is crucial to monitoring climate change, and especially to assessing the potential impact of carbon dioxide and methane ‘bombs’ being released by Russia’s melting permafrost as part of a feedback loop. Such a situation will negatively impact climate change prediction models at large.

Signs of increasing collaboration in the Arctic between Russia and other members of the so-called BRICS+ (Brazil, India, China, South Africa, Iran, Saudia Arabia, the United Arab Emirates, Egypt and Ethiopia) have prompted further concern that Moscow may be preparing to pursue the commercial exploitation of the Arctic Zone of the Russian Federation (AZRF) independently of the Arctic 7. With Chinese interests in mind, such a situation could be to Moscow’s long-term detriment, as Beijing might be tempted to impose its own views on Arctic governance.

Meanwhile, Russia has shown little appetite for addressing circumpolar challenges relating to climate change, the rights of indigenous communities, the management of biodiversity and living resources, environmental pollution, and the threat of radioactive contamination from Soviet-era and current nuclear activities.

Amid all this uncertainty over the future of Arctic cooperation and whether the Arctic Council can survive (without betraying the West’s commitment to Ukraine), military activity in the region has continued to increase. The accession of Finland and Sweden to NATO necessarily requires a re-evaluation of the Alliance’s defence planning across the Wider North (comprising the North Atlantic, Arctic and Baltic). This is likely to become a significant point of contention with Moscow, particularly as it begins to drive the restructuring of commands in the European and Northern theatres, the reconfiguration of forces and deployments, and new patterns of training and exercising.

Viewed from Moscow, the ‘enlargement’ of NATO closer to Russian borders is feeding a sense of not only vindication but also increased conventional vulnerability. Furthermore, melting ice in the AZRF is no longer a reliable source of protection along Russia’s northern border, which is further strengthening the Kremlin’s Arctic insecurities. Russia’s own Arctic ground forces in the European High North have been largely decimated by war operations in Ukraine, which will continue to divert attention and resources away from the Arctic theatre.

However, Moscow’s military posture in the Arctic has not changed in the context of the full-scale invasion of Ukraine, and it remains bent on obsessive control over the AZRF and countering NATO activity. Russia’s vast multi-layered network of Arctic-capable air and coastal defence systems has stayed in place along the AZRF and has not been tremendously impacted by the war against Ukraine.

In this context – and judging by the sense of conventional vulnerability fuelling Russia’s Arctic insecurities – there is a risk that Moscow could engage in more overt nuclear sabre-rattling and escalatory behaviour. There remains an outside chance that Russia could resume nuclear weapons testing on the islands of Novaya Zemlya. This situation is compounded by the inherent risk of miscalculation provoked by accidents, incidents and tactical errors, left unchecked by the current absence of lines of communication.

Meanwhile, the fragmentation of circumpolar cooperation is closing doors on diplomatic activity that could help to diffuse tensions and promote confidence-building measures. Prior to 2022, there was some discussion of re-establishing joint military forums or some form of ‘code of conduct’, but this dissipated quickly as Moscow’s designs on Ukraine became clear. The chances of a predictable Arctic in military security terms are growing slimmer.

The risk of an armed conflict in the Arctic is clearly higher than it was. However, this does not mean that either NATO or Moscow is any more likely to seek a conflict in the Arctic than they were prior to Russia’s assault on Ukraine. Considering the complexity of the operating environment, there is little incentive for Moscow – or NATO – to escalate in the Arctic per se, let alone conduct high-intensity warfare operations there.

There is no sign yet (publicly at least) that either side is seeking to change the ‘facts on the ground’ regarding critical international agreements, or even press claims in areas of disagreement – for instance, over how to interpret the Svalbard Treaty on the UN Convention on the Law of the Sea (UNCLOS) as it applies to the Northeast Passage (including the Northern Sea Route, or NSR) and the delimitation of extended continental shelves.

Nevertheless, Russia remains determined to control ‘its’ Arctic and the NSR. Over the past few years, successive waves of regulations have increasingly restricted passage through the NSR, placing it under Moscow’s tight control. If, even as the effects of climate change are felt, Russia maintains its dubious interpretation of the status of the NSR, or if the Kremlin seeks to further restrict passage along the route (especially for foreign military vessels), there could be more serious consideration of a US- or NATO-led Freedom of Navigation operation, even if it increases the risk of an armed clash.

These issues are all the more critical in the context of the renewed US interest in Arctic affairs as part of the 2022 National Strategy for the Arctic Region (NSAR) and its 2023 Implementation Plan. Indeed, the NSAR is quite clear regarding protecting freedom of navigation across the Arctic region in accordance with UNCLOS.

For now, the most likely scenario is that we will continue to see a balancing and counterbalancing of NATO and Russian forces in the High North as both sides adjust to the realities of Swedish and Finnish membership of NATO. The danger is that this could increase the risk of a miscalculation provoked by an accident escalating into something worse. More presence and platforms in a changing Arctic will undoubtedly bring about more incidents, including environmental catastrophes and human-made disasters, with indigenous peoples and other local communities bearing the brunt of the impact.

Beyond that, we anticipate that the Arctic will remain in limbo until one side or the other makes a move to either restore or abandon the Arctic Council, or attempts to press a claim that undermines the commitment that all the Arctic states made in Ilulissat in 2008 (and again in 2018) to resolve their disputes in accordance with international law. The wider risk is that in the absence of a circumpolar approach, creeping alternatives will harden the dividing lines between Russia and the West.

Neither side currently looks ready to blink first. China, meanwhile, may seek to exploit the fragmentation of Arctic governance to push for its own ‘free for all’ approach. All the while, human insecurity and climate breakdown in the Arctic look set to worsen.

#### The risk of miscalculation and nuclear war is high

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Long gone are the days of “duck and cover” drills and fallout shelters in America, when the fears of nuclear war were on the minds of most. For decades, cooler heads prevailed, and the U.S. and Russia worked cooperatively to reduce the risk of nuclear conflict and decrease the size of their arsenals. By 2022, cooperation began disintegrating as Russia’s botched invasion of Ukraine raised serious concerns about nuclear escalation and severely hampered the prospects of future nuclear arms control agreements. With Russia seemingly dismissing the Trump administration’s rather conciliatory efforts to end the war, there appears to be no end in sight, and Europe is feeling the pressure, embarking on a massive effort to boost its own defense.

Amidst these tensions, melting polar ice is opening Arctic sea lanes to increased shipping traffic, resource exploration, and military posturing. NATO’s newest members, Finland and Sweden, are Arctic nations. Russia currently dominates the Arctic region, holding 53% of its total coastline, operating the world’s biggest icebreaker fleet, and has been upgrading its Arctic military bases. China is also increasingly playing a role, conducting joint Arctic military exercises with Russia and employing an icebreaker fleet of its own, despite its complete lack of territory in the Arctic Circle.

But is the Arctic destined to be the most likely flashpoint for a nuclear war? Let’s look at the possibilities.

Despite being so cold, the Arctic is no stranger to military conflict, holding major strategic value and serving as a passageway to both the Atlantic and Pacific. During World War II, the Battle of the Atlantic extended into the Arctic and ships carrying American war supplies to the Soviet Union traversed the Northern Sea Route. Germany invaded Norway, and the Soviet Union invaded Finland in the Winter War of 1940. As the Cold War evolved, the Arctic became a major theater for submarine activity.

Today, President Trump’s insistence on acquiring Greenland “one way or the other” highlights the growing importance of the Arctic to the security interests of the United States. Greenland’s geographic location, combined with the U.S.’ operation of Pituffik Space Base in the high north, provides key “missile warning, missile defense, and space surveillance” capabilities. The shortest flight paths for nuclear missiles between the U.S. and Russia exist over the Arctic Ocean, and the loss of this base on account of a diplomatic blunder could open a key blind spot in America’s strategic defense. Alternatively, the loss of this base to a Russian attack aimed at disabling American missile detection infrastructure is unlikely due to the danger of immediate retaliation and escalation.

Currently, the most likely path to a potential nuclear exchange in the Arctic would be through a conventional or “gray zone” Russian attack on a NATO member. Border skirmishes, cyber-attacks, airspace incursions, reckless military intercepts, and support to separatist groups intentionally sit in the “gray zone” between peace and outright war, but could ultimately lead to open conflict that escalates to nuclear war. Conceivably, a gray zone or overt attack on other Greelandic infrastructure, or an information operations campaign aimed at dividing the U.S., Greenland, and Denmark, are not outside of the realm of possibility.

With NATO’s addition of Sweden and, more importantly, Finland—which shares a 1,343 km border with Russia—there is increased opportunity that a NATO Arctic state could be attacked. Highlighting this risk, American forces in Alaska recently staged a drill in which hundreds of troops were flown to Finland to defend against a mock Russian invasion. Yet rather than an overt invasion of a NATO member, Russia is far more likely test the waters by conducting provocative and destabilizing small-scale gray zone activities. The disastrous results of Russia’s invasion of Ukraine have likely raised doubts in Moscow about its ability to achieve its objectives in a direct attack on a nuclear armed country, let alone a large NATO ally, making a direct attack unlikely. It is not entirely clear where the red line on gray zone activities would be for Finland or what would trigger an Article 5 collective defense declaration short of a direct attack across the border.

Though the threat of American nuclear weapons has long-served to deter a Russian attack on the European NATO members, President Trump’s many public pronouncements expressing doubt about his willingness to defend a NATO member that comes under attack has shaken confidence in Europe about America’s commitment. As a result, France and the UK are considering expanding their arsenals, signifying an increased reliance on nuclear posturing for deterrence, including for the defense of Arctic NATO members. France is reconsidering whether it wants to decommission its current warheads as it brings replacements online, potentially doubling of the size of its arsenal. It is simultaneously upgrading an airbase closer to the German border to be able to host nuclear weapons. The UK, which has been historically dependent on the U.S. for its nuclear arsenal, is recently questioning that dependence, and may seek other options to assure an effective and reliable deterrent. This could foretell a new nuclear arms race.

The upcoming February 2026 expiration of New START, the last remaining strategic nuclear arms treaty between the U.S. and Russia, portends a period of nuclear proliferation that could echo the nuclear arms buildups of the Cold War. Meanwhile, China, which has been operating in the Arctic, has been engaging in its own rapid nuclear buildup in an effort to potentially exceed 1,000 warheads by 2035. China has consistently rejected efforts to join a multilateral nuclear arms reduction treaty with the U.S. and Russia, citing its comparatively much smaller nuclear arsenal.

Navigation issues in the Arctic could also lead to military escalations reaching the nuclear level. The Global Navigation Satellite System (GNSS), which includes satellite constellations like the American GPS system or Russian GLONASS, sees decreased reliability and accuracy in the Arctic. The reasons for this are abundant, like the orbital inclination of the satellites themselves and ionospheric interference. With increased incidents of Russian GNSS jamming in Europe, it’s conceivable that Russia may employ similar tactics in the Arctic, including spoofing, for the purpose of disruption or causing navigational errors to trigger an exploitable international incident. Military or civilian vessels straying into Russian territory could be captured, their cargoes seized, or crews held hostage for the purpose of conducting hostage diplomacy. Resolving such a confrontation military could quickly spiral out of control.

Yet considering these combined factors, the Arctic does not exist in a vacuum, and there are other regions in which nuclear tensions are rising.

The threat of a Chinese invasion of Taiwan is the most likely scenario for a direct confrontation between the United States and another nuclear power. Though he has not signaled any specific intent to attack, President Xi aims for the Chinese military to be capable of invading Taiwan by 2027. While President Biden indicated his intention to directly aid Taiwan if this occurred, President Trump appears to defer to the traditional American position of strategic ambiguity over the island. Should China decide to invade, and the U.S. responds to defend Taiwan, it is difficult to see Washington opting to detonate a nuclear weapon over an issue that does not directly threaten the U.S. mainland or a NATO ally. On the other hand, a subsequent attack on Chinese mainland military sites in order to disable an attacking Chinese invasion force could plausibly incite a nuclear response.

What is most concerning is that provocative military behavior anywhere could lead to an unintentional cycle of escalation that ultimately results in a nuclear exchange. As the Arctic opens to more military and commercial activity, the frequency of encounters between military forces is likely to increase. As those encounters increase, so too does the probability that an accident or unintended attack may occur. As Russia routinely flies patrols into the Alaska Air Defense Identification Zone, an area of international air space in which the U.S. identifies all aircraft, aggressive behavior by Russian pilots raises the risk of a routine encounter evolving into an international incident. But these aggressive incidents are much more frequent elsewhere, like the Baltic and North Seas. For example, in 2022, a Russian SU-27 fighter jet fired two missiles against a British RC-135 surveillance jet over the Black Sea, but fortunately neither missile hit their target. Similarly, China is known for conducting frequent unsafe intercepts of foreign aircraft in the East and South China Seas.

In the end, the likeliness that the Arctic or any other region sees the confrontation leading to nuclear war is more about the actors involved and the choices they make rather than the regions themselves. Actors committed to the peaceful resolution of disputes will find ways to preserve that peace. Yet in an era of machismo, confrontation, and conquest, we could all find ourselves walking off a dangerous cliff from which there is no return.

#### The plan solves. The Arctic Science Agreement is a way to legally restore cooperation with Russia through the Arctic Council. It reduces the risk of miscalculation and escalation.

Paul Dziatkowiec, 2023 - Director of Mediation and Peace Support at the Geneva Centre for Security Policy, and creator and facilitator of the High North Talks. “Diplomatic Deadlock in the Arctic: Science as an entry point to renewed dialogue” Arctic Yearbook 2023 <https://arcticyearbook.com/images/yearbook/2023/Commentaries/3C_Dziatkowiec_AY2023.pdf> //DH

In the decades since the end of the Cold War, science has regularly been depicted as an entry point to dialogue aimed at alleviating political conflict or diplomatic tensions. Science is after all not politics; it is a universal good, a common language, and a shared value; moreover, it is grounded in widely-agreed fact rather than opinion, which means that - at least in theory - it is less prone to ideological influence.

Even during the Cold War, science diplomacy helped to maintain threads of communication across ideological divides, and provided the vehicle and substance for dialogue (see for example Davis & Patman (eds), 2015). Thanks to science diplomacy, despite geopolitical tensions the superpowers were able to find common ground and work together where they perceived a mutual interest or a shared threat. Convergence around the language of science may have helped them to avert an even greater rupture, and perhaps more dangerous escalations.

Regrettably today’s geopolitical climate appears to be less amenable to constructive exchange and joint, pragmatic problem-solving. Russia’s brutal attack on Ukraine triggered an enormous counterreaction that has led to the severing of West-Russia communications on multifarious international issues and in various regions, including the High North.

As such, the Arctic is fast becoming a new theatre for great power politics. The recent sharpening of geopolitical tensions introduces new unknown variables into the international security landscape, and affects a broad gamut of issues on which West-Russia coordination was once taken for granted, including science. Without constructive communication - which has almost completely ceased - there are risks that misunderstandings, miscalculations, or simple neglect may lead to an environmental disaster or a dangerous new conflagration.

In the absence of an adequate forum for addressing the urgent threats facing the Arctic, in 2022 the Geneva Centre for Security Policy (GCSP) launched a discreet dialogue process, the ‘High North Talks’, which has met regularly since. The Talks offer an informal platform for discussing - in a neutral setting - the threats and challenges, potential solutions, and possible areas of renewed cooperation in the Arctic. Attendees include experts from states with a stake in the region - Arctic Council members (including Russia), as well as other actors like China, the EU, Japan and India.

In the context of Russia’s attack on Ukraine, the High North Talks explore how Arctic affairs could be managed more effectively in spite of the geopolitical turbulence. The Talks constitute one of the few remaining venues where representatives from the countries most invested in the Arctic can meet, in a safe and discreet environment, to discuss the future of this region.

One of the most urgent topics is the need to restore some meaningful cooperation between the West and Russia, at least on the most pressing issues like climate change monitoring. While the rationale for the West’s response to Russian aggression in Ukraine is clear and understood, it is crucial that ways be found - perhaps through policies that allow for targeted coordination in ‘exceptional’ cases - to manage ongoing problems of global significance.

The case for resuming (the most urgent) scientific cooperation

There are at least three compelling arguments as to why scientific cooperation in the Arctic should be resumed, with a view to averting an environmental disaster. These arguments are based on law, principle, and scientific fact.

A legal obligation

The 2017 Agreement on Enhancing International Arctic Scientific Cooperation, whose explicit purpose is to ‘enhance cooperation in Scientific Activities’ (Article 2), is still in force. The signatories - who are the eight Arctic states1 - recognised in their Agreement the importance of constructive cooperation and environmental protection in the Arctic (preambular paragraphs 1 and 2); reiterated the urgent need for increased actions to mitigate and adapt to climate change (preambular paragraph 3); and noted the importance of international scientific cooperation (preambular paragraph 5).

Moreover, in order to achieve said enhanced cooperation, the states parties entered into a number of commitments, including to facilitate the entry and exit of persons and equipment involved in scientific activities (Article 4), as well as access to research infrastructure and facilities (Article 5), research areas (Article 6) and data (Article 7).

These commitments are legally binding. Article 18 provides for the amendment of the Agreement, and 19(3) for automatic renewal after its initial five-year validity unless a party announces its withdrawal from it. Also, any party may withdraw via written notification (Article 19(4)). However, since these provisions have not been triggered, the Agreement remains valid and binding.

Acute regional and global shocks since the signing of the Agreement have significantly altered the geopolitical landscape, and rendered various forms of collaboration untenable. However, the urgency of the problems afflicting the Arctic has not diminished in line with reduced cooperation, nor have the obligations contained in the 2017 Agreement been put on hold. The parties must be cognizant of the fact that if its provisions are not followed, not only will states be in breach of their international legal obligations, but the rest of the world will face real life repercussions.

#### The plan’s a critical first step to restoring full Russian participation in the Arctic Council. Arctic science diplomacy has a long history of success.

Carol Dyck, 2024 – doctoral student Western University, Faculty of Law “On thin ice: The Arctic Council’s uncertain future” Marine Policy Volume 163, May 2024, <https://www.sciencedirect.com/science/article/pii/S0308597X24000587> //DH

The question remains to what extent the Arctic seven are open to trust Russia at this time. Kal Kornhuber et al. argue that, “[r]esuming key elements of critically needed scientific and political cooperation is dependent on the end of Russian aggression against Ukraine.”50; Indeed, the Russian State’s readiness to violate international law and escalate conflicts, signals that disagreements with Russia “must now be viewed in a new light.”51; However, for Ambassador Høglund, “functioning cooperation between all Arctic countries is important” and “[t]he best answer to possible challenges with such cooperation is that we hold on to the Arctic Council as the most important forum for Arctic issues.”52; With military activity steadily rising in the north53 and alliances crumbling, a situation reminiscent of the Cold War, soft power outlets are needed more than ever. While the Russian invasion of Ukraine has broken trust, an Arctic Council without participation of Russia would be severely impaired; the global community would likely have real doubts about its legitimacy. Rebuilding that trust is critical as the Arctic experiences rising ecological, economic and geopolitical stressors associated with accelerated warming; principally focusing on common environmental challenges, through the resumption of scientific collaboration with Russia, could serve as that first key goodwill step.

4. Navigating an ice-free Arctic: waves of discontent

As the Arctic Council grapples with its uncertain future, it similarly must contend with an alarming rate of sea-ice loss and the new geopolitical challenges and economic opportunities this transformation brings forth. When the Arctic Council released the first comprehensive, multidisciplinary assessment of the impacts of climate change on the Arctic, the global community became acutely aware of the challenges it faces. The 2005 Arctic Climate Impact Assessment54 detailed the stunning transformation taking place in the north, as warming temperatures profoundly alter the region’s terrestrial landscape and marine environment through rapid melting of sea-ice and permafrost, which threatens the region’s ecological integrity and biodiversity. The Arctic, once considered a “frozen desert”55; accessible only with specialized marine vessels, is undergoing a radical physical alteration, reshaping shorelines,56 and opening newly accessible waterways. This change will have far reaching implications for its ecological integrity, as well as its future place on the global economic and political stage. Year after year, Arctic ice cover reaches new record lows.57 The Arctic Ocean is now 40 percent ice-free at its lowest ice cover in September.58 Despite international efforts to keep global temperatures below a 1.5℃ increase, models predict a 2°C rise in the Arctic by 2040, which would result in an ice-free passage for cargo and supply ships in the Beaufort Sea and parts of the Northwest Passage for over half of the year.59 With a predicted 4°C increase by 2100, ice would no longer cover the Arctic Ocean for two thirds of the year; private vessels and cruise ships, not equipped with ice-breaking equipment, could sail freely through the Arctic Ocean.60 As the once frozen Arctic Ocean transforms “in a single generation into a newly accessible ocean,”61; Arctic scholarship speaks increasingly of a “new” Arctic, a term encompassing both environmental and economic change.

The Arctic no longer lies on the periphery of economic and political discourse. The potential for significant economic gains, particularly in oil and gas exploitation, minerals, fishing and shipping, has attracted non-Arctic States’ attention. These States question the logic of a regional forum since climate change, and its role in the unprecedented transformation of the Arctic environment, are global concerns that require an international response, especially as socioeconomic and geopolitical ties between the Arctic and the rest of the world draw tighter. China has proven particularly vocal regarding its discontent with the Arctic’s historically regional governance structure.

In its 2018 White Paper on Arctic Policy, China made clear that it no longer wants to take a back seat in Arctic governance.62 At a distance of almost 1500 km from the Arctic Circle, China identifies itself as a “Near-Arctic State”.63 In its White Paper, intended to clarify China’s Arctic Strategy, it is careful not to make any territorial claims on the Arctic,64 which could threaten its Arctic Council Observer status; the “Near-Arctic” identity differentiates China from the Arctic States, but still puts it in a position of advantage relative to other states.65 The White Paper left many questions regarding China’s intentions, which did nothing to quell concerns that non-Arctic States may undermine the status quo in the Arctic. Canada, Russia and the United States, in particular, have distrusted China’s Arctic ambitions, even challenging China’s application for Observer status.66 More recently, the United States and Canada have expressed fears over the “dual purpose” of China’s research in the Arctic Ocean, especially the presence of submarines.67

China recognized early that scientific research offers a legitimate means by which to engage in Arctic governance.68 With its growing fleet of Arctic capable ships and science station on Svalbard, China has engaged in extensive research, which it highlighted in its bid to gain Observer status. Now, however, China sees the Arctic Council’s focus on environmental protection and knowledge sharing as limiting. It believes the Council should address key economic and political issues of an ice-free Arctic, but its Observer status does not permit China to influence the Council’s remit or agenda.69 Ultimately, China may tire of the scientific and environmental focus of the Arctic Council and see little benefit in its Observer status. Additionally, with Russia’s exclusion from scientific projects, China, though cautious not to antagonize the Arctic seven, may see Russia as a more welcoming Arctic research partner. A growing apprehension exists that as a result “alternative ad hoc forums and exclusive circles of discussion” could emerge, a situation which “could undermine the fundamental circumpolar vision” at the centre of the Arctic Council.70 For now, with relations strained between the Member States and among Observers, steering clear of economic and geopolitical issues and heavily reinvesting in cooperative missions that include China could prevent the fracturing of the Council into separate camps with limited cross-dialogue.

5. Science diplomacy and the road to rebuilding trust

When Norway assumed the Chairship of the Arctic Council, it acknowledged that it is a “difficult and challenging time for international cooperation”.71 Given the tensions, and the very real risk that Russia may walk away from the Council, triggering two (opposing) blocks operating in the Arctic, and the inability for the Arctic Council to engage in political issues, common ground is necessary elsewhere. It is here that science diplomacy could play a role in recapturing the congenial nature of the Arctic Council of the past. Harriet Harden-Davies outlined how science diplomacy has operated as a “catalyst for cooperation in international spaces”72; offering opportunities for diplomacy when geopolitical tensions are high. Science diplomacy, which Harden-Davies defined as the “use of scientific cooperation to address common problems and build international partnerships,”73; already has a long and proven history of success in the Arctic. As Kornhuber et al. noted, “The success story of the Arctic Council is, to a large extent, built on scientific cooperation, recognized that policy-making must be based on scientific knowledge”.74 In an environment undergoing unprecedented environmental change, science is critical to devise common goals and effective policies and implement long-term adaptive management in response to new knowledge.

Since Gorbachev’s then-improbable call on Arctic States to come together to expand knowledge of and protect the regional environment, long-time adversaries overcame entrenched suspicion and succeeded in producing and sharing critical scientific discoveries, particularly the 2005 Arctic Climate Impact Assessment. Even as tensions skyrocketed during the Syrian war and the Crimea crisis, the Arctic Council was able to continue with its research on a range of topics, including Arctic biodiversity, climate change and marine conservation, as well as facilitate key agreements, notably the Agreement on Cooperation on Marine Oil Pollution Preparedness and Response in the Arctic (2013) and the Agreement on Enhancing International Arctic Scientific Cooperation (2017). Consequently, returning to a strong focus on scientific cooperation seems a logical first step to diffusing growing tension and military posturing. As Harden-Davies noted, “[s]cience can offer a safe “port” in a sometimes stormy sea of discussions.”75; If ever a safe “port” were needed for the Arctic Council, that time is now.

Science has the advantage of serving as a great unifier. It is non-threatening, and, ideally, non-competitive; scientists recognize the value of generating knowledge, dataset sharing and exchanging theories, especially in areas of research requiring costly specialized equipment. This transmission of findings and ideas is prized even more when it relates to pressing issues of global concern, such as climate change or biodiversity loss. Collaboration necessarily is economically advantageous and increases the likelihood of more expeditious research missions. Critically, though, cooperation among scientists from around the globe offers opportunities to engage in meaningful dialogue in a neutral setting, to create new alliances and, importantly, to establish trust.76 Through the benign, non-threatening channel of science kernels of confidence can blossom into alliances and ultimately peace. Scientific collaboration and dialogue can temper even the most politically-charged subjects, allowing for greater synergy between States’ national interests.77 In February and March of 2022, international Arctic research organizations (from both Arctic and non-Arctic States) and Arctic Indigenous groups participated in three webinars regarding the high North. Despite Russia’s invasion of Ukraine, it participated in all three webinars, which “convey[ed] the importance of open science with both allies and adversaries for our shared survival as a globally interconnected civilization.”78; The ongoing exclusion of Russian research institutes from collaborate projects is resulting in significant knowledge gaps since Russia accounts for approximately half of the Arctic region.79

Writing before the Crimea Crisis and the Ukraine war, Paul Arthur Berkman referred to the Antarctic Treaty as an example of the power of science to act as a “tool” for diplomacy80 and envisioned that, following in a similar vein, “the high seas surrounding the North Pole could become the next pole of peace.”81; The events of the past several months have severely disrupted the work of the Council and called into question its ability to weather this latest crisis. However, despite the frosty relations between the Arctic Council Member States, as well as between some Observers, significant scope remains to rebuild trust and further essential Arctic governance operations as the region faces multiple and intensifying stressors. By refocusing efforts on scientific principles and collaboration, doors to wider strategic diplomacy will open and the Arctic Council can get back on track. Promising signs have already come with the resumption of operations by Council Working Groups.82 Reaffirming the original intention of Gorbachev’s Murmansk speech and recommitment to mutually beneficial scientific projects can serve as a vital starting point to preserve the Arctic Council even as diplomatic relations far from the Arctic waver.

#### Russia will agree to the plan. It views scientific cooperation through the Arctic Council as important to its great power status

Pavel Devyatkin, 2022 – Senior Associate and Leadership Group member at The Arctic Institute with a research focus on Russian Arctic policy. “Can cooperation be restored?” Arctic Yearbook, <https://arcticyearbook.com/arctic-yearbook/2022/2022-briefing-notes/443-can-cooperation-be-restored> //DH

Evidently, Russia places great importance on its position in the AC. Russian experts and diplomats have said Russia’s exclusion from it is counterproductive and irrational. Russian Ambassador to the United States, Anatoly Antonov, and Minister of Natural Resources, Alexander Kozlov, have gone as far as calling it illegitimate and claiming that the boycott violates the principles of consensus given that Russia is the chair of the AC during this period (RIA Novosti, 2022). Russian and international scientists have also drawn attention to data gaps that result from cutting off Russian Arctic scientists. Arctic climate research is crucial since warming in the region is a bellwether for global climate change.

As such statements demonstrate, Arctic cooperation with Western states is important to Russia, especially in regards to its recognition as a great power. Discussions of great power status may remind many of realist theory in international relations but I would argue that the English School theory of international relations is a more accurate framework for thinking about Russia’s great power ambitions in the Arctic. English School theory contends that great powers must be recognized by others in their responsibilities to maintain peace and security in international society (Kopra, 2018). Great power status, not just as it applies to Russia, depends not only on how a state views itself but on how other actors recognize a country as a responsible power. In this sense, being seen as a willing and responsible actor in environmentalist and progressive forms of Arctic cooperation is important for Russia’s claims to great power status.

#### \* It’s in Russia’s self interest to genuinely resume permafrost cooperation through the Arctic Council

Katarina Kertysova and Akash Ramnath, 2021 – \*Policy Fellow at the European Leadership Network (ELN) and a Global Fellow at the Kennan and Polar Institutes of the Woodrow Wilson International Centre for Scholars AND \*\*Junior Research Fellow with the Planetary Security Initiative (PSI) at the Clingendael Institute and is completing an Advanced Masters in IR & Diplomacy from Leiden University, the Netherlands. “How Permafrost Thaw Puts the Russian Arctic at Risk” IPI Global Observatory, 11/22,

<https://theglobalobservatory.org/2021/11/how-permafrost-thaw-puts-the-russian-arctic-at-risk/> //DH

Permafrost covers more than 60 percent of Russia’s territory, putting several large river ports and cities with over 100,000 inhabitants at risk. Siberia has experienced record-breaking temperatures—over 100 degrees Fahrenheit in June 2020, for the first time in recorded history. Devastating wildfires that recently hit the permafrost zones of northeast Siberia brought attention to permafrost’s potential to release carbon and methane and contribute to further warming. It also underscored the possibility that a thaw could activate more long-frozen deadly pathogens, as happened in 2016.

The Economic Cost of Thaw

According to the Russian Academy of Sciences, Russia has as much as USD 250 billion worth of physical infrastructure at risk due to the thawing of permafrost. Its energy sector infrastructure―pipelines, pump stations, and extraction facilities―is of particular concern, owing not only to its economic importance but also the environmental risks associated with oil spills. It is estimated that 35,000 incidents take place annually in Western Siberia, 21 percent of which are linked to land and ground degradation. Last year’s oil spill in Norilsk, which is believed to have been linked to a permafrost thaw, contaminated an area of approximately 350 square kilometers. As permafrost melting accelerates, such accidents will become more common. There are also radioactive waste repositories and nuclear stations where permafrost thaw affects the bearing capacity of their structural foundations, which could increase the number of incidents that cause the release of hazardous substances.

By 2050, up to 45 percent of Russia’s Arctic hydrocarbon extraction fields could suffer severe damages, and several pipelines, namely the Eastern Siberia-Pacific Ocean oil pipeline and gas pipelines from the Yamal-Nenets region, would be at considerable risk. In addition to hydrocarbons, permafrost thaw puts Moscow’s ambitious mining projects at risk, and may render abandoned mines—whose wastes are locked up in the frozen soil—a liability.

Permafrost degradation is also detrimental to the roads and rail tracks that cross frozen land, as well as airports, riverine and oceanic port facilities, and military installations built on permafrost. According to Russia’s Environment Minister Alexander Kozlov, more than 40 percent of infrastructure facilities and buildings have already suffered damage. The risk to military installations should not be understated, as their degradation could weaken Russia’s ability to protect its northern borders, ensure the safety of the Northern Sea Route, and exercise the perimeter defense of the Kola Peninsula, which is of strategic importance to Russian national security. According to Mathieu Boulègue, Research Fellow at Chatham House, Russian media claims that the military and dual-use installations along the Arctic zone of the Russian Federation are adapted to changing conditions are largely unproven.

Permafrost thaw also threatens to derail Russian agricultural security. Even though it is expected to open up millions of acres of land for potential arable farming, the land is often lopsided and difficult to manage, as well as acidic, thin, and unable to support cash crops (which rely on almost year-round usage). It is thus unclear how much agricultural benefit Russia can draw from Siberia. The bigger issue is that worsening climate change—which permafrost thaw will contribute to—is projected to cause increased droughts and more volatile wheat yield in Russia’s southern bread baskets.

Thawing is also causing limestone deposits to release methane, mercury, and radon into the surroundings. Mercury poisoning from water sources has been reported in permafrost regions; this release on a larger scale could have devastating consequences on Russian health security. Radon is considered the second-leading cause of lung cancer.

Measures Taken by Moscow

The issue of permafrost degradation had been absent from Russia’s official policy documents until May this year, when Moscow announced plans to establish a new nationwide monitoring system for permafrost, as well as to amend two federal laws. Part of Moscow’s vision is to set up a network of 140 stations in three years to study the permafrost. In addition, a laboratory for permafrost studies—the first of its kind in Russia—will open in the Yamal-Nenets region this year. However, the focus in Moscow remains on adaptation rather than mitigation strategies.

Despite worsening Russia-West relations on other fronts, negative consequences of permafrost degradation bind Arctic states together. The Arctic Council, the leading intergovernmental forum for Arctic affairs, constitutes an ideal venue where permafrost thaw could be addressed collaboratively. In May this year, Russia assumed the rotating chairmanship of the Arctic Council for a two-year term. Environmental protection and climate change rank high on its chairmanship agenda, with particular emphasis being placed on collaborative research. During its chairmanship, Russia will have an opportunity to enhance scientific research and collaboration with other Arctic states, and to develop collective approaches to examining the effects of permafrost degradation on the region. As suggested by the Arctic Institute, closer interaction among weather observation services of individual Arctic states is needed, with the aim to eventually establish an effective global permafrost monitoring system.

The Kremlin has recognized that thawing permafrost can have devastating economic as well as environmental consequences. Although Moscow already pursues adaptation measures for the impacts of permafrost thaw, its emissions reduction targets lack ambition. This is a global concern, and a substantial reduction in emissions by all major polluters is needed if there is any hope of preserving permafrost areas and preventing tipping points from being crossed. In addition, improved data sharing and scientific collaboration among Arctic states, especially on engineering solutions, will help anticipate and manage the risks collaboratively. Although the science is alarming, meaningful action can help stem the tide of thawing and mitigate Moscow’s strategic concerns for the region.

#### \*Limited science cooperation exists now. Expanding it to climate data builds trust and de-escalates conflict

Pavel Devyatkin, 2024 – senior associate at the Arctic Institute (Washington, DC) and a PhD fellow and lecturer at HSE University (Moscow) “Can Russian-US Scientific Cooperation Be Restored as Arctic Warming and the Ukraine War Intensify?” The Nation, 4/16, <https://www.thenation.com/article/world/russia-global-warming-science-diplomacy/> //DH

Restoring Cooperation

Two years into the war in Ukraine, there are some headways in Russia-West Arctic cooperation. Norway took over the chair of the Arctic Council in 2023 and is gradually resuming work with Russia.

In February 2024, the council announced that official meetings of project and expert working groups will resume in a digital format. A month before, Norway’s chief Arctic official, Morten Høglund, met in person with the six Indigenous peoples’ organizations, including two representatives from Russia.

Norway’s relationship with Russia can serve as an example for dealing with Russia under the current political circumstances. In recent years, Norway has imposed sanctions against Russia, signed a bilateral defense agreement with the United States, and hosted NATO troops in the largest military exercise since the Cold War. At the same time, Norway continues collaboration with Russia to comanage fisheries in the Barents Sea, the Norwegian-Russian border, and Coast Guard rescue operations.

Similarly, the United States maintains some channels of cooperation with Russia in the Arctic, especially in the Bering Strait. The US and Russian Coast Guards maintain lines of communication to protect people and marine resources on both sides of the strait. While joint exercises have been on hold, the US and Russian Coast Guards still commit to the enduring agreements on search-and-rescue and emergency operations. Cooperation continues even against the background of provocative Russian naval exercises off the coast of Alaska.

Moreover, there is collaboration at the individual and informal levels. Some academic conferences in the US and Russia, where scientists share research on Arctic natural and social sciences, still involve Russian and American researchers. Such developments demonstrate that while relations may have been mostly severed, there are still narrow openings for cooperation around issues that are seen as essential.

Lessons from History

Despite the stark challenges of reigniting full-fledged cooperation today, the United States and Russia have a long history of polar science cooperation and diplomacy over common interests during times of geopolitical confrontation.

During the Cold War, American and Russian researchers engaged in numerous scientific exchanges and joined dozens of countries to study sea ice, aurora borealis and polar meteorology as part of the 1957–58 International Geophysical Year. In the 1970s, the US and USSR signed landmark agreements on environmental protection and polar bear conservation.

At the end of the Cold War, the cooperation between Soviet and Western Arctic scientists built interstate trust and spilled over into the political and military spheres. In a famous 1987 speech in northern Russia, Soviet leader Mikhail Gorbachev recognized that “the community and interrelationship of the interests of our entire world is felt in the Arctic, perhaps more than anywhere else,” and that “scientific exploration of the Arctic is of immense importance for the whole of mankind.” Gorbachev’s ruminations went on to inspire the 1996 formation of the Arctic Council.

After the Cold War, US-Russia Arctic cooperation skyrocketed as Western researchers poured into the previously inaccessible Russian Arctic. Notable collaborations include the Russian-American Long-term Census of the Arctic (RUSALCA, which means “mermaid” in Russian). Across several expeditions to the Bering and Chukchi Seas between 2004 and 2015, Russian and American scientists jointly studied marine chemistry, glaciology, oceanography, and ecosystems.

RUSALCA existed “as a miracle,” according to its participants, because of initial opposition from Russian and American security services. The project continued against the background of political tensions related to the 2008 Russo-Georgian War and 2014 Ukraine crisis. Such examples offer practical examples for common-interest cooperation despite steep political disagreements.

Today, climate science has fallen victim to the diplomatic fallout of the war in Ukraine. Nonetheless, there remains significant and ongoing support from international scientists and Arctic residents for Moscow and Washington to find a common understanding in studying and tackling the Arctic climate crisis.

Scientific cooperation, an essential endeavor for the world’s survival, can help build trust between the United States and Russia, and prevent a conflict in a region that has not seen interstate violence since World War II.

#### \*The plan builds trust between the US and Russia and leads to lasting cooperation in every area

Pavel Devyatkin, 2025 – senior associate at the Arctic Institute (Washington, DC) and a PhD fellow and lecturer at HSE University (Moscow) “A New Age for US-Russia Arctic Cooperation?” The Nation, 3/18, <https://www.thenation.com/article/world/russia-putin-trump-climate-diplomacy-war/> //DH

The Arctic, warming four times faster than the rest of the world, may be the key region for the US and Russia to advance cooperation. US-Russia rapprochement may broadly benefit the world by bringing an end to the disastrous war in Ukraine and reducing the risk of nuclear war, but existential environmental issues still demand attention.

The Trump administration has started purging government websites of climate data. It is now the task of civil society to elevate climate change as a concern and pressure the two countries to include climate change in the Arctic cooperation agenda. The Arctic climate crisis is the “canary in the coal mine” for what awaits other regions.

At the February 18, 2025, Rubio-Lavrov meeting in Riyadh, Kirill Dmitriev, CEO of the Russian Direct Investment Fund, named the region as a potential setting for US-Russia cooperation: “We need to pursue joint projects, including, for example, in the Arctic.” The Arctic region makes sense as a setting for cooperation as the two sides have explicitly expressed interest in exploring cooperation in energy, investment, and geopolitical issues. Western sanctions on Russia have led Moscow to step up its cooperation in the Arctic with China in joint energy ventures and grand plans for Arctic shipping. US officials now see Arctic cooperation as a potential means to “drive a wedge” between Moscow and Beijing.

In my meetings in Moscow with American and Russian diplomats and businessmen over the past few weeks, it is clear that many are interested in diverse forms of Arctic cooperation, from cultural diplomacy that celebrates the commonalities of Indigenous peoples on both sides of the Bering Strait, to scientific diplomacy to understand and adapt to climate hazards faced by both nations. Business interests, however, are at the top of the agenda.

Trump’s suggestion to acquire Greenland, not ruling out military or economic coercion, has reignited global concerns over Arctic stability. Trump’s threats against Denmark, a NATO ally, have caused alarm in the Euro-Atlantic community. While some Russian state media pundits celebrated Trump’s statements, Russian diplomats criticized the destabilizing effect of the proposal and said that Trump’s plan “can only bring uncertainty and tension to the region.”

Together with Trump’s desire to acquire Ukraine’s resources and reduce the US’ dependence on Chinese rare earth, it is clear that rare earth minerals are a key focus of Trump’s political worldview. Greenland has large deposits of rare earth elements and is strategically positioned alongside Arctic shipping lanes and offshore oil deposits. Putin’s offer to open Russian rare earth minerals to joint exploration with the US may also have implications for Arctic cooperation.

Trump has grumbled about Russian and Chinese ships “all over the place” near Greenland, indicating an element of great power competition in Trump’s Greenland fixation. This is a misunderstanding of Arctic security, as Russian and Chinese military activity is far from Greenland, occasionally operating together in the Bering Strait near Alaska. Greenland may, however, play a role in North American defense as a radar outpost to detect threats coming from across the North Pole.

The announced plan to revamp diplomatic relations and restore the staff of the countries’ diplomatic missions will significantly reduce the current obstacles to US-Russia scientific cooperation in the Arctic. By making it easier to issue visas and travel between the two countries, Americans and Russians will again be able to conduct joint research, expeditions, and scientific conferences and build models to better understand the unfolding climate emergency. Scientific cooperation to understand the changes affecting sea ice, permafrost, ecosystems, and local communities has been blunted by the political fallout of the war in Ukraine.

Cooperation in the Arctic can help build regional stability. More importantly, Arctic cooperation will build trust between the US and Russia that could complement or spill over into other crucial fields of cooperation such as arms control, Middle East peace, and global health.

# Case Extensions

## Arctic Science Advantage

### They Say: “No Permafrost Tipping Points”

#### Abrupt thaw releases most carbon as methane, which is 30 times more powerful as a greenhouse gas

Mongabay, 2020 – non-profit conservation and environmental science news platform. This report quotes Merritt Turetsky, director of the Institute of Arctic and Alpine Research at the University of Colorado Boulder, “Arctic Permafrost Moving Toward Crisis, Abrupt Thaw a Growing Risk: Studies” 5/20, <https://earth.org/arctic-permafrost-abrupt-thaw-a-risk/> //DH

In a paper published in February in Nature Geoscience, Turetsky and her co-authors found that, while abrupt thaw will likely occur in less than 20% of the world’s permafrost zone, it could affect half of all permafrost carbon through rapid erosion, collapsing ground and landslides. Despite influencing only a small portion of the Arctic, abrupt thaw emissions could have the same climate feedback effect as gradual thaw emissions would over the entire permafrost zone.

These abrupt releases could trigger a positive feedback loop whereby the permafrost’s greenhouse gas emissions would further warm the atmosphere, which would then thaw more permafrost and release more carbon. Turetsky says that without accounting for abrupt thaws, we’re underestimating the impact of permafrost carbon releases by 50 percent.

The Methane Conundrum

“The climate consequences are as high as gradual thaw because abrupt thaw is releasing a lot more of its carbon as methane,” Turetsky explains.

Though permafrost serves as a carbon sink, when that carbon is released into the atmosphere it can come out as either carbon dioxide (C02) or methane (CH4), depending on whether the carbon stores were subject to aerobic or anaerobic respiration. The danger here: methane is far more potent as a greenhouse gas than CO2, trapping up to 30 times more atmospheric solar radiation.

“If you look at just the magnitude of carbon, abrupt thaw only releases about 40 percent of the carbon relative to gradual thaw. But that carbon comes out as a lot of methane and it has bigger climate consequences,” Turetsky says.

“It’s both worrisome and reassuring at the exact time,” she adds. “What we now know is that abrupt thaw doesn’t affect a huge area of the Arctic” — that’s the good news — “but it does carry a punch. It affects the deepest and most carbon rich soils which are found in areas prone to abrupt thaw.”

In their 2019 paper, “The Polar Regions in a 2 Degree C Warmer World,” the authors lay out several emission scenarios that span releases between a modest increase of 10 teragrams of extra methane per year, to more than 50 teragrams through 2080 assuming a 2 degrees C increase in global temperature.

“Although increases in methane emissions in excess of 50 Tg represent extreme scenarios, these projections do not consider possible abrupt changes or accelerating trends. Given the potential for decomposition of large stocks of organic soil carbon, such changes could be an important factor in the future,” the authors write.

#### Permafrost thaw will rapidly accelerate global warming past tipping points – it will contribute 20 times more to warming than all current emissions

Zimeng Wang, et al, 2024 – Shanghai Key Laboratory of Atmospheric Particle Pollution and Prevention, Department of Environmental Science and Engineering, International Centre of Excellence-Risk Interconnectivity and Governance on Weather/Climate Extremes Impact and Public Health, Institute of Atmospheric Sciences, Fudan University, Shanghai “Awakening: Potential Release of Dormant Chemicals from Thawing Permafrost Soils under Climate Change” Environmental Science & Technology,

<https://pubs.acs.org/doi/pdf/10.1021/acs.est.4c06014?casa_token=4aty_5Rbm18AAAAA:e1ukpaxnpgT73dR-aCHjCK1PdwSTsX-GEoE2Md1pMlraLq8A7RgwxSmifki37FIwpNRbo6kmyQvJjcE>

Greenhouse Gases. Greenhouse gas emissions from thawing permafrost have been extensively explored. A warming climate can accelerate the microbial breakdown of organic carbon, leading to increased release of greenhouse gases.15,16 This process creates a feedback loop that may accelerate climate change more rapidly than human emissions alone.1 For example, long-term observations in Northeast Greenland indicate that permafrost thaw is leading to the thickening of the active layer by >1 cm year"1, fast mobilization of permafrost C and the production of C02.18 Under anoxic conditions, thawing permafrost also releases CH4 (methane), a more potent greenhouse gas than CO2, which can also contribute to positive permafrost carbon-climate feedback, further exacerbating climate change.19

One of the most pressing challenges at present is the uncertainty in the actual rates and the timing of carbon mobilization over decadal to centurial time scales, and the lack of consistency in the limited number of studies on circum- polar-scale observations by far. It is estimated that the gradual thaw of permafrost and deepening of the active layer, which usually occurs in seasonally thawed soils, can result in carbon losses of up to 208 Pg C by 2300 under the RCP8.5 warming scenarios (For comparison, the current rate of anthropogenic fossil carbon emissions is approximately 10 Pg C per year).20'21 Abrupt thaw, which involves the collapse of ice-rich permafrost, can lead to carbon emissions on the order of 80 ± 19 PgC by 2300, equivalent to approximately 40% of the mean net emissions attributed to the gradual thaw.22,23 These emissions primarily arise from newly formed features such as thermokarsts and hillslope erosions, where the biogeochemical "hot spots" and "hot moments" converge. The release of carbon from thawing permafrost is a significant concern as it contributes to the positive climate feedback, further accelerating global warming, particularly after reaching tipping points.

In contrast to the well-recognized permafrost carbon feedback to climate change, the fate of permafrost nitrogen (N) upon thaw is less understood. Northern permafrost- affected peatlands store about 10 ± 7 Pg N that is susceptible to be mobilized under climate change.2> Strong plant- microorganism competition causes a general nitrogen limitation in permafrost-affected soils, often preventing the production and release of nitrous oxide (N20), which is a highly potent greenhouse gas.26'2 However, recent measurements have challenged the previous notion that permafrost- affected soils are negligible sources of N20 emissions.28 Measurements have shown that vegetated soils in permafrost regions are small but evident sources of N20 during the growing season, while barren or sparsely vegetated post-thaw soils can emit up to 5 times that of the frozen soils and serve as substantial sources of N20, highlighting the importance of permafrost-affected soils in the Earth's N20 budget.29 From there, climate warming and associated permafrost thaw, and other disturbances, could potentially turn permafrost regions into a globally relevant source of N20, creating a noncarbon permafrost feedback to the global climate system.

### They Say: “Warming’s Not Existential”

#### Their models fail to account for abrupt permafrost thaw – the impact is underestimated

Lynn Heller, 2025 – strategic climate policy researcher with Woodwell Climate Research Center’s Permafrost Pathways project, “Thawing Grounds, Rising Stakes: The Importance of Including Permafrost Emissions in Climate Policy” Arctic Institute, 4/1, <https://www.thearcticinstitute.org/thawing-grounds-rising-stakes-importance-including-permafrost-emissions-climate-policy/> //DH

Permafrost holds approximately 1.4 trillion metric tons of carbon, nearly twice the amount currently in the atmosphere.3) It has been a stable carbon sink for millennia, but this frozen ground has begun to thaw as the Arctic experiences more rapid warming. When permafrost thaws, it releases carbon dioxide and methane, potent GHGs, into the atmosphere. Once initiated, this process accelerates global warming, creating a feedback loop where permafrost thaw leads to further emissions, exacerbating the warming that triggered it.

While gradual thaw processes are somewhat predictable, abrupt thaw events, known as thermokarsts, often triggered by landslides, wildfires, or other environmental changes, can suddenly release massive amounts of carbon, leading to substantial and unpredictable emissions. Many current climate models fail to account for these abrupt thaws, resulting in underestimated future emissions.4) Recent studies suggest that about 77% of near-surface permafrost could be lost by 2100, potentially releasing massive quantities of carbon and other harmful pollutants that could accelerate global warming.5) Addressing this uncertainty necessitates the development of a more comprehensive carbon monitoring system in the Arctic to accurately capture both gradual and abrupt thaw emissions, ensuring that climate policies reflect the full scale of potential risks.

#### Climate change is existential

Gopi Upreti, 2023 - emeritus professor at the Institute of Agriculture and Animal Sciences at Tribhuvan University (TU) in Nepal “Climate Change and Its Threat to Humanity in the Anthropocene” in Ecosociocentrism, SpringerLink database, accessed via University of Michigan //DH

If we contemplate the most extreme possible outcome for Earth's climate future, and given the seeming indifference of political and global corporate elites to heed scientific advice or public sentiment toward decarbonizing the economy, then we are potentially looking at an increase of global temperatures by 5.4 °F (3 °C) by 2050. Scientists predict that at this threshold, the world's ice sheets would disappear, severe droughts would decimate vast sections of the Amazon forest (eradicating one of the world's largest carbon offsets), and Earth would enter a feedback loop of increasingly intense and deadly conditions (Carleton et al., 2021; Hansen et al., 2011; Hsiang et al., 2019; Mulholland, 2019). In this bleak scenario, 35% of the global land area and 55% of the global population would be exposed to lethal heat conditions for more than 20 days a year, pushing the limits of human survivability. Concurrently, droughts, floods, and wildfires would regularly devastate the landscape. About one-third of the world's land surface would transform into deserts. Complete ecosystems, starting with the planet's coral reefs, rainforests, Arctic ice sheets, and the total deglaciation of the Hindu Kush Himalayan region, would collapse. The agricultural productivity of the tropics would be devastated, displacing more than one billion people. This mass migration, coupled with diminishing coastlines and acute shortages of food and water, would strain the societal fabric of the world's most populous nations. Conflicts over resources could escalate, potentially even culminating in nuclear war. If not urgently addressed with comprehensive mitigation strategies and restoration efforts, this scenario could mark the end of global human civilization as we currently know it. It is like sailing in a leaky boat on a stormy sea.

#### Warming’s approaching irreversible tipping points that risk famine, ecosystem collapse and war

Gopi Upreti, 2023 - emeritus professor at the Institute of Agriculture and Animal Sciences at Tribhuvan University (TU) in Nepal “Climate Change and Its Threat to Humanity in the Anthropocene” in Ecosociocentrism, SpringerLink database, accessed via University of Michigan //DH

Researchers are sounding the alarm, predicting that the world is on a trajectory toward a tipping point marked by extinctions and unpredictable changes on a scale unprecedented since the retreat of the glaciers 12,000 years ago (Pappas, 2012). Professor Anthony Barnosky et al. (2012) from the University of California, Berkeley, along with 17 other scientists, caution that planet Earth may transform into a less hospitable abode for life. As per Barnosky et al. (2012), "There is a very high possibility that by the end of the century, the Earth is going to be a very different place. You can envision these changes as a fast period of adjustment where we get pushed through the eye of the needle. As we are going through the eye of the needle, that is when we see political strife, economic strife, war, and famine." The smooth curve in blue shows northern hemisphere temperatures over a period of 1000 years. Its uncertainty range is in light blue, which is overlaid with green dots showing a 30-year global average. The red curve shows the measured global mean temperature since the Industrial Revolution.

For decades, climate change deniers have vigorously attempted to discredit the hockey stick graph (Graph 7.2) developed by Michael Mann and his colleagues. However, in a remarkable turn of events, more than 25 years later, numerous independent reconstructions of past temperature changes have emerged, all validating Mann and his colleagues' original findings. Recently, during his acceptance inaugural speech for the Humanist of the Year award by the American Humanist Association (AHA), Michael Mann had eloquently articulated the significance of these validations. He had highlighted that the latest studies suggest that the warming of our planet in recent decades is unparalleled in tens of thousands and even hundreds of thousands of years (Mann, 2023).

This emphasizes the unprecedented nature of the situation we find ourselves in today, as we are involved in an uncontrolled and unparalleled experiment with the only planet we currently call home—a planet that sustains us and countless other life-forms. Mann and his colleagues have significantly contributed to our under- standing of the urgent need to address climate change and its consequences. As we continue to navigate the complexities of this global issue, Mann's words serve as a reminder of the critical importance of safeguarding our planet for the benefit of cur- rent and future generations and living systems on planet Earth.

Alan Buis (2011) predicts that by 2100, anthropogenic climate change will induce shifts in ecosystems and plant communities across almost half of Earth's land surface. This will result in nearly 40% of land-based ecosystems transitioning from one major ecological community type to another, such as forests, grasslands, or tundra. Scientists have been raising concerns about the ecological repercussions of global warming of even a few degrees. Should major greenhouse gas-emitting countries fail to drastically reduce their emissions and limit the global temperature increase to below 1.5 °C by 2050, all terrestrial ecosystems on planet Earth will be subjected to major transformations that will drastically alter the world's biomes. This will have far-reaching consequences for everything from water and food security to public health and biodiversity loss. Unchecked climate change could fundamentally transform our terrestrial ecosystems, posing immense risks to the diversity of our planet. It is likely to result in dramatic global landscape changes, equivalent to an ecological transformation occurring over one or two centuries, akin to the transformation that took place over 10-20 thousand years at the end of the last deglaciation period 21,000 years ago (E360 Digest, 2018). The changes in the atmosphere and oceans can profoundly impact the biosphere, the delicate layer of life on Earth that is intrinsically interwoven with the atmosphere and hydrosphere and provides the life-supporting matrix within which human societies exist. Yadvinder Malhi et al. (2020) posit that the degradation or restoration of parts of the biosphere will likely have regional or planetary consequences, including anthropo- genic greenhouse gas emissions, which drive both climate change and ocean acidification, increasingly threatening the viability and resilience of natural ecosystems and the human societies that depend upon them.

Cultivation of land through agriculture, along with millennia of deforestation, has potentially injected hundreds of billions of tons of carbon into Earth's atmosphere. As we transitioned into the industrial era, our reliance on carbon-laden sources of energy further exacerbated this issue. The combustion of coal and natural gas in power plants that illuminate our homes and the use of petroleum in various modes of transportation have collectively bolstered the net accumulation of carbon dioxide (C02) in the atmo- sphere. At present, an average person emits approximately 5 tons of carbon dioxide annually, a quarter of which will endure in the atmosphere for over a millennium (Hsiang et al., 2017). Greenhouse gases like CO: disrupt the planet's energy equilib- rium. According to Hsiang and Kopp (2018), the escalation of greenhouse gases in the atmosphere obstructs some of this reradiation, rechanneling energy back toward Earth. An increase of 1% in atmospheric C02 concentrations translates to roughly 27 trillion watts, or 0.05 watts per square meter. This is equivalent to the energy output of a Hiroshima-scale atomic bomb disseminating across Earth's surface every 2.3 s. The concept that anthropogenic activities could modify the climate goes back to nearly two centuries. Empirical studies conducted in the latter half of the twentieth century have cemented the understanding that human actions have been pivotal in reshaping the climate (Stocker et al., 2013; UGCRP. 2017). Given the weight of scientific evidence, the hypothesis positing no human influence on global climate has been unequivocally refuted (Hegerl et al., 2007).

Researchers have reviewed extensive studies on climate change, ecology, and Earth's tipping points, revealing thresholds that, when surpassed, can incite an environmental domino effect. Excessive pressure on the environment can catalyze these inflection points, triggering major global transitions (Barnosky et al., 2012). The most recent of such a transition has been the conclusion of the last glacial period when, within a span of 3000 years. Earth transitioned from being 30% ice-covered to its current near ice-free state. A substantial portion of the extinctions and ecological shifts occurred within a mere 1600 years. Between 1970 and 2010, our planet has experienced a staggering loss of 52% of its biodiversity, thereby heightening concerns about the revival of Earth's lost biodiversity (Lipton et al., 2018; Specktor, 2019). In the present day, human-induced alterations to the environment occur at a pace exceeding natural ones. The Industrial Revolution, instigated by a 35% increase in atmospheric carbon dioxide, has induced global temperature increases that outpace those observed in preindustrial times. Concurrently, humans have extensively modified 43% of Earth's land surface for urban and agricultural purposes, compared to the 30% land surface transition that occurred at the close of the last glacial period. With the human population burgeoning, exerting increasing pressure on existing resources (with a current population of eight billion), the consequences are challenging to predict, as these tipping points are propelling the planet into uncharted territories.

A departure from the current trajectory necessitates robust political determination and global collaboration. By 2025, human activities are projected to utilize 50% of Earth’s surface. With an inevitable population boom to nine billion by 2050, efficiency in resource utilization is crucial for sustainability. This necessitates more efficient energy consumption and production, a heightened focus on renewable resources, and an immediate imperative to conserve species and habitats for future generations. Scientists (Specktor, 2019; Pappas, 2012; Carrington, 2019) urge us to acknowledge that we are at a critical juncture. Should we opt for inertia, we risk encountering these tipping points and an unimaginable future dystopia for our descendants. Climate change is perceived as the foremost threat to our planet. It could intensify extreme weather events, precipitate droughts in some regions, destabilize rainfall patterns, accelerate glacial melting in the Himalayas and Antarctica, alter the global distribution of animals and diseases, and inundate low-lying areas due to rising sea levels (Lipton et al., 2018; Hausfather, 2017; Kolasi, 2017).

An alarming policy paper from an Australian think tank contends that the risks posed by climate change are more severe than generally anticipated (Specktor, 2019). This paper underscores that climate change presents a near-to-midterm existential threat to human civilization and that societal collapse by 2050 is a tangible risk if substantial mitigation efforts are not implemented in the ensuing decade. It warns that climate scientists have been overly conservative in their predictions about climate change’s impact on the planet in the near future. The ongoing climate crisis surpasses any previous human encounters in its magnitude and complexity. According to Hayhoe et al. (2018), global average temperature has escalated by about 1.8 °F from 1901 to 2016. As a result of the precarious shifts in climate and weather owing to the relatively small changes of one or two degrees in the planet’s average temperature, numerous global regions have experienced changes in rainfall patterns, culminating in more floods, droughts, and intense rain as well as more frequent and severe heat waves. The planet’s oceans, as well as the glaciers and ice caps in high mountainous regions and Antarctica, have witnessed significant alterations; oceans are warming and acidifying, glaciers and ice caps are melting rapidly, and sea levels are rising (Fleming et al., 2018). Climate scientists and researchers warn that when these and other adverse changes become more pronounced in the coming decades, they will pose formidable challenges and threats to humanity and the environment that we once perceived to be safe and secure. These adverse climate changes will impact all aspects of human, natural life, and environmental services. Researchers engaged in impact studies of climate change have summarized these impacts as follows:

• Climate change-induced warmer temperatures have escalated the frequency, intensity, and duration of heat waves, posing health risks, especially for young children and the elderly (Vose et al., 2017).

• Climate change has deleterious implications for human health by worsening air and water quality, facilitating the spread of certain diseases, and altering the frequency or intensity of extreme weather events (Fann et al., 2016).

• Rising sea levels induced by climate change pose threats to human communities and ecosystems in coastal regions worldwide (Fleming et al., 2018).

• Changes in rainfall patterns and streamflow timing and amount, resulting from climate change, impact water supply and quality and hydroelectricity production in many parts of the world (Lall et al., 2018).

• Changes in ecosystems induced by climate change have influenced the geo- graphic ranges of numerous plant and animal species and the timing of their life cycle events, such as migration and reproduction (Lipton et al., 2018).

• The increased frequency and intensity of extreme weather events due to climate change, such as heat waves, droughts, and floods, lead to property losses, societal disruptions, and decreased insurance affordability (Ebi et al., 2018).

### They Say: “Research Won’t Change Policy”

#### Empirically – better data leads to policy change through the Arctic Council

Yulia Yamineva and Kati Kulovesi, 2018 – both from the Centre for Climate, Energy and Environmental Law, Law School, University of Eastern Finland. “Keeping the Arctic White: The Legal and Governance Landscape for Reducing Short-Lived Climate Pollutants in the Arctic Region” Transnational Environmental Law; Cambridge Vol. 7, Iss. 2, (Jul 2018): 201-227. Proquest //DH

**POPs = Persistent Organic Pollutants. SLCPs = Short Lived Climate Pollutants (black carbon and methane)**

The establishment of the process for periodic expert assessment of the progress made and scientific reporting is also significant. The Arctic Council has been successful in the past in influencing regional and national policy making through large-scale scientific assessments: for instance, its early work on POPs influenced negotiations on a POPs protocol under the CLRTAP and on the 2001 Stockholm Convention on Persistent Organic Pollutants. 91 In pushing for stronger action on SLCPs in other fora, the Arctic Council has the ability to highlight the impacts of SLCPs on Arctic communities, capitalizing on the role of its permanent participants, as it did in respect of POPs. In addition, in its ambition to reach a wider group of non-Arctic countries and stakeholders, the Arctic Council’s approach may be more inclusive, and therefore potentially able to inspire action and promote responsibility among businesses, cities, local government, and citizens. 92

#### Risk perception influences decision-making. More research creates support for adaptation

Susanna Gartler et al, 2025 – Professor in Department of Social and Cultural Anthropology at University of Vienna, Austrian Polar Research Institute “A transdisciplinary, comparative analysis reveals key risks from Arctic permafrost thaw” Nature, 1/16 <https://www.nature.com/articles/s43247-024-01883-w> //DH

The Arctic permafrost, home to more than three million people1, forms the foundation of human life and is a crucial component of coupled socioecological systems2. Arctic permafrost is, however, warming and thawing3,4,5, and projections indicate that most of it will degrade and disappear by 2050 1. Driven by climatic and environmental changes, as well as human disturbances, permafrost thaw poses considerable risks with far-reaching implications for the global climate system and local Arctic communities. These risks, in conjunction with rapid socioenvironmental transformations6,7,8,9 and competing geopolitical interests10, necessitate urgent understanding and action. At the global scale, the release of greenhouse gases from thawing permafrost creates a feedback loop that exacerbates climate warming and perpetuates permafrost degradation11,12,13,14. Regionally and locally, permafrost thaw leads to physical, chemical, and biological shifts and landscape and ecosystem alterations 6,7,15, which often result in hazards. These hazards, defined as harmful phenomena with adverse impacts, significantly affect Arctic communities’ livelihoods16,17,18,19 and nearly all aspects of human life, including the economy20, infrastructure21,22,23, culture and heritage24,25,26,27, fisheries 28,29, food and water security 17,30,31 and health 32,33,34,35,36. Such complex interrelations and sequences of events constitute risks that are perceived differently among (i) individuals (e.g., scientists, local stakeholders) on the basis of their worldviews, needs, and concerns37, as well as (ii) Arctic communities due to their differences in historical, cultural, environmental, and socioeconomic settings19,38. Risk perceptions ultimately influence decision-making and the implementation of the mitigation and adaptation strategies needed for local risk management. In this context, comprehensive assessments that consider the multifaceted aspects of permafrost thaw risk and diverse perceptions are essential tools for informing policymaking.

Risk assessment is the process of systematically identifying, analyzing, and evaluating (qualitatively or quantitatively) risks. In the scientific literature, risk definitions and assessment methods differ greatly, focusing either on the physical or social dimensions of risk and rarely considering its subjective nature through perceptions39. In addition, the growing body of knowledge on climate-related hazards and risk assessments in the Arctic thus far consists mostly of sectoral studies40,41,42,43,44,45, which lack a comparative approach. The risks and impacts of permafrost thaw on coupled socioecological systems46 remain understudied from an inter- and transdisciplinary perspective47,48,49. The fact that risks are not perceived or understood uniformly, neither by local stakeholders nor across scientific disciplines, underscores the importance of developing a comprehensive and transdisciplinary understanding of both the environmental and societal implications of permafrost thaw. This understanding is crucial for addressing the challenges posed by permafrost degradation while considering both the unique and shared challenges faced by Arctic communities in the context of climate change.

#### Improving data can be used internationally to develop climate solutions

Zimeng Wang, et al, 2024 – Shanghai Key Laboratory of Atmospheric Particle Pollution and Prevention, Department of Environmental Science and Engineering, International Centre of Excellence-Risk Interconnectivity and Governance on Weather/Climate Extremes Impact and Public Health, Institute of Atmospheric Sciences, Fudan University, Shanghai “Awakening: Potential Release of Dormant Chemicals from Thawing Permafrost Soils under Climate Change” Environmental Science & Technology,

<https://pubs.acs.org/doi/pdf/10.1021/acs.est.4c06014?casa_token=4aty_5Rbm18AAAAA:e1ukpaxnpgT73dR-aCHjCK1PdwSTsX-GEoE2Md1pMlraLq8A7RgwxSmifki37FIwpNRbo6kmyQvJjcE>

Therefore, more collaboration between analytical chemists, biogeochemists, and microbiologists in permafrost research should be encouraged to advance permafrost research. Despite some progress in understanding the release of chemical compounds from thawing permafrost, a substantial knowledge gap remains concerning the specific biogeochemical pathways and the microbial mediators involved. For example, linking the production, consumption, and transformation of dormant chemicals to specific microbial groups or biochemical pathways could greatly enhance our understanding of these biogeochemical processes and the associated risks of permafrost thaw.70,71 The application of advanced molecular techniques, such as metagenomic and metatranscriptomic analyses, alongside stable isotope probing methods, presents a promising avenue to elucidate the underlying mechanisms of these biogeochemical processes in permafrost thaw.27, 72 This integrated approach is essential for advancing our knowledge and developing effective strategies to mitigate the impacts of climate change on these fragile ecosystems.

Broadly, the implications of releasing dormant chemicals from permafrost thaw extend beyond the immediate area of occurrence. For instance, these chemicals can dissolve and enter downstream ecosystems through rivers and meltwater runoff, especially in Arctic regions, posing significant environmental risks to these areas. 1 Such movement of pollutants underscores the need to understand and mitigate the wide- reaching effects of permafrost thaw on ecological health and safety beyond its immediate vicinity, which requires the research attention beyond polar science researchers.

Overall, permafrost thaw represents a complex, multidimensional research topic that requires multidisciplinary approaches, incorporating expertise from climatology, geochemistry, microbiology, and, crucially, environmental chemistry. Immediate and coordinated efforts can be prioritized toward the most vulnerable regions (e.g., Circumpolar North, Qinghai-Tibet Plateau) and chemicals of high risks (such as POPs, HOCs, heavy metals according to their local situations), and to develop robust monitoring networks that can provide more reliable data on permafrost dynamics. Such collaborative efforts will facilitate a thorough understanding of the extensive impacts of permafrost thaw on ecosystems, climate, and the environment. They are also crucial for refining models, enhancing predictions, and developing effective solutions and strategies, which is vital for making research findings accessible to policymakers and the public. In turn, policymakers can support these efforts by implementing concrete policy measures, such as targeted funding mechanisms and the establishment of regulatory frameworks, involving organizations such as the United Nations Environment Programme (UNEP), the Arctic Council, the Intergovernmental Panel on Climate Change (IPCC), and relevant national agencies, thereby facilitating informed decision-making and ensuring swift, science-based responses to emerging environmental challenges.

### They Say: “Trump Cuts Irreversible”

#### The plan fiats a commitment to Arctic science by increasing funding and working under the auspices of the Arctic Council

John Holdren, 2025 - John Holdren is the Teresa and John Heinz Research Professor of Environmental Policy at Harvard Kennedy School and co-director of the Science, Technology, and Public Policy Program in the School’s Belfer Center for Science and International Affairs. “The Arctic faces historic pressures from competition, climate change, and Trump” Policycast Podcast, Episode 284, 5/15, hosted by Ralph Renalli. <https://www.hks.harvard.edu/faculty-research/policycast/arctic-faces-historic-pressures-competition-climate-change-and-trump#transcript> //DH

John Holdren: Well, let me take an initial shot. I don’t think we’re going to be able to restore anything like an adequate level of international collaboration on this issue unless we can reverse some of what the Trump administration has done. We need to be back in the Paris Agreement. We need to be full participants in the Intergovernmental Panel on Climate Change. We need to have our government officials attending the meetings of the Arctic Council, meetings of the Arctic Circle Assembly. We need to have the funding of Arctic issues at NOAA, at NASA, at the EPA, at the National Science Foundation restored. We have seen Trump essentially trying to cripple all of climate science in this country, including polar climate science. They have savaged the staffs at all these agencies–at NSF, at NOAA, at NASA. You know, they fired their chief scientist at NASA, who was a brilliant woman climate scientist. They have fired most of the polar sciences staff at NSF. We can’t get out of this unless we can reverse that.

### They Say: “Arctic Disease Isn’t A Threat”

#### Smallpox and Spanish flu were already found in permafrost – the diversity of microbes can create existential pandemics

Amr El-Sayed and Mohamed Kamel, 2020 - Department of Medicine and Infectious Diseases, Faculty of Veterinary Medicine, Cairo University “Future threat from the past” Environ Sci Pollut Res Int. 2020 Oct 17;28(2):1287–1291 <https://pmc.ncbi.nlm.nih.gov/articles/PMC7567650/> //DH

Global warming is one of the major challenges facing humanity. The increase in the Earth’s temperature and thawing of ancient ice release viable viruses, bacteria, fungi, and other microorganisms which were trapped for thousands and millions of years. Such microorganisms may belong to novel microbial species, unknown genotypes of present pathogens, already eradicated pathogens, or even known pathogens that gained extremely robust characteristics due to their subjection to long-term stress. These worries drew more attention following the death of a child by ancient anthrax spores in Siberian in 2016 and the reconstruction of smallpox and Spanish flu genomes from ancient frozen biological samples. The present review illustrates some examples of recently recovered pathogens after being buried for millions of years, including some identified viable ancient viruses, bacteria and even other forms of life. While some pathogens could be revived, genomes of other ancient pathogens which could not be revived were re-constructed. The present study aims to highlight and alarm the hidden aspect of global warming on the international public health, which represents future threats from the past for humanity.

Introduction

With the continuous evolution and emergence of new unknown pathogens in the last decades, such as SARS, MERS, Ebola, and recently SARS2 (Covid-19), it is clear that international public health faces severe challenges. However, the re-emergence of serious infectious diseases which were previously partially or completely eradicated represents a similar public health hazard. One of the main reasons for the re-occurrence of eradicated diseases is attributed to the global warming. Among the most underestimated harmful effects of the global warming is the melting of the ice layer and the release of buried materials since decades including radioactive wastes (Colgan et al. 2016), and liberates billions of tons of carbon dioxide and methane gas into the air (Knoblauch et al. 2018), and could even release a huge amount of trapped heavy metals to the surrounding environment and groundwater (McConnell et al. 2018).

Thawing of frozen snow may also liberate frozen biological materials since tens and hundreds of thousands of years, including ancient viruses and bacteria. Microbiological examination of tissue samples obtained from a frozen mammoth in Siberian revealed the presence of members of the genera Carnobacterium and Lactosphera, which could be cultured on anaerobic media (El-Sayed and Kamel 2020; Pikuta et al. 2011). Similarly, examination of the gut microbiome of the frozen body of rhinoceros, which represents another extinct animal species, could detect the presence of Firmicutes (mainly members of the family Clostridiaceae), Proteobacteria, Actinobacteria, TM7, and Bacteroidetes (Mardanov et al. 2012). Ancient bacteria were also isolated from environmental samples rather than the bodies of frozen animals. The diversity of newly detected bacterial species in ice is huge. Climatic changes that may lead to thawing of ice and the revival of bacteria will have potential effects with unexpected consequences. (Brouchkov et al. 2017). A 300,000-years-old virus and 8 million years old bacteria could be isolated from Siberian and Antarctica, respectively. Fourteen bacterial isolates could also be isolated from 750,000-year-old ice samples obtained from the Tibetan Plateau. In 2016, ancient anthrax spores stored in frozen soil in Siberian resulted in the death of a child died and hospitalization of an additional 20 persons (El-Sayed and Kamel 2020; Christner et al. 2003). However, the melted snow also released unknown bacteria/viruses that were trapped and preserved for thousands and possibly millions of years. Microbiological investigation of ice samples obtained from the Tibetan Plateau revealed four types of known viruses in addition to 28 novel viral genera and abundant bacteria. Similarly, the investigation of frozen samples from Siberia described for the first time a 30,000-year-old giant virus. The virus retained its viability and infectivity (Legendre et al. 2015).

The international worry is not only limited to the revival of unknown ancient viruses but also pathogens which were already eradicated. Fatal pathogens as smallpox may re-emerge from a mummified corpse (Reardon 2014).

Various bacteria respond to environmental stress by entering a viable non-culturable state (VBNC) (McDougald et al. 1999), even the presence of killed/non-viable bacterial DNA in the melted ice represents a great threat according to the concept of Griffith’s experiment. In 1928, Frederick Griffith mixed a heat-killed rough strain with a smooth strain of Streptococcus pneumoniae and injected the mixture in a mouse. The mouse died due to bacterial transformation. It is worth mentioning that killed microbes in glacial ice are very well preserved due to the sub-zero temperature by (Griffiths 2000). Moreover, the revived ancient bacteria were subjected to stress for many thousands and probably millions of years which improved their ability to survive and overcome unsuitable environmental conditions. Among the developed survival mechanisms of newly discovered bacteria is their ability to resist the damaging effect of antibiotics (Petrova et al. 2011; D'Costa et al. 2011).

Identification of viable ancient viruses

The high robustness of smallpox virus (variola) enabled the virus to survive under different unfavourable conditions. Remnants of smallpox DNA could be detected around the world. The viral DNA could be identified in skin lesions of the 3200-year-old mummy of Rameses V in Egypt (Reardon 2014).

In 1991, in a small village near the North Pole, Russian experts discovered a wooden vault which was full of frozen victims who died from smallpox in the nineteenth century during the smallpox epidemic there. This discovery arose the question about the possible comeback of smallpox following floods induced by glacial ice thawing due to global warming. This worry is justified by the robust properties of smallpox and its ability to withstand freezing for a long time (Stone 2002; Ambrose 2011; Biagini et al. 2012).

Although all attempts to isolate viable variola from preserved human scabs and corpses were not successful, the viral genome could be re-construct through sequencing the detected DNA fragments, which represents a huge threat for public health (Reardon 2014; Duggan et al. 2016). Like smallpox virus, different influenza viruses are also known to persist natural freezing for a long time (Zhang et al. 2006). In 1997, several trials were attempted to revive the 1918 pandemic influenza virus from frozen samples. Although these trials failed to achieve their goal, they could partially sequence and characterize partial sequences of the restored RNA (Taubenberger 1997; Reid et al. 1999). The trials continued later with the development of reverse genetics technology where the virus could be completely re-constructed (Taubenberger et al. 2007, 2012). Additional unknown viruses could also be detected in a 700-year-old caribou frozen stool which was stored in a permanent ice layer. Two viruses (RNA and DNA viruses) could be recovered and characterized in two different laboratories from the frozen faecal sample (Ng et al. 2014).

One of the oldest viable viruses was detected in ice samples obtained from Greenland. Various genotypes of the plant virus (Tomato mosaic tobamovirus) could be identified in approximately 140,000-year-old ice layers. The highly conserved viruses are characterized by their high stability and their wide host range (Castello et al. 1999).

The newly discovered ancestral amoeba-infecting DNA viruses (Pithovirus sibericum and Mollivirus sibericum viruses) are estimated to be older than 30,000 years old. It belongs to an unknown type of giant viruses. They are among the largest viruses ever known and can even be seen under a light microscope. Although Pithovirus sibericum is 1.5 μm in length, its genome is relatively small (approximately 600 kb) packaged in uniquely amphora-like shaped particles. The virus kept its viability and infectivity (Legendre et al. 2014, 2015.

Another virus (Emiliania huxleyi virus) was also detected in 7000-year-old sediment samples obtained from the Black Sea. The obtained data confirmed the ability of the virus to survive hard environmental conditions for centuries (Coolen 2011).

As the viruses are defined as particles that are not alive outside the living organism, their survival over thousands of years was not a big surprise. The survival of ancient frozen bacteria over millions of years despite the hard environmental conditions was not expected to date. The adverse environmental conditions include not only the low temperature but also the absence of nutrients and sources of energy, in addition to the increase in the concentration of nascent oxygen at low temperature (which has a damaging effect on bacterial DNA /RNA and proteins). However, the bacteria could maintain their metabolic activities, could grow, and even could multiply through the development of novel metabolic survival strategies, such as methanogenesis in addition to their potential DNA repair mechanisms in association with high-stress tolerance (Lewis et al. 2008; Johnson et al. 2007; Vishnivetskaya et al. 2000; Tuorto et al. 2014; Hultman et al. 2015).

It is also worth mentioning that viable bacteria could be detected not only in frozen ice but also in ancient highly preserved fossils. Bacillus sphaericus and Staphylococcus succinus could be revived and cultured from 25 to 40 million-year-old Dominican amber (Greenblatt et al. 1999).

Identification of viable ancient bacteria

Ancient DNA fragments from various human pathogens could be extracted and identified. Some of these DNA fragments originated from the Bronze Age. Among the identified pathogens are DNA from Mycobacterium tuberculosis, Mycobacterium leprae, Vibrio cholerae, Yersinia pestis, and Helicobacter pylori (Margaryan et al. 2018).

Generally, the isolation of various gram-positive and gram-negative bacteria from ancient ice samples has been previously reported. In Siberian samples, the prevalence of gram-negative bacteria was much higher than gram-positive ones. The majority of these isolates were identified as Arthrobacter (Actinobacteria) and Planococcus (Firmicutes) (Shi et al. 1997; Hinsa-Leasure et al. 2010).

Few pockets of 34-million-year old ice layers in the Antarctic continent are still preserved. Investigation of the ice samples revealed the presence of viable metabolically active bacteria, which are estimated to be 8 million years old. These bacteria are among the oldest known living organisms on earth. The revival of the bacteria was only possible following long incubation at 4 °C in the dark. Sequencing of the DNA of the revived bacteria identified them as Arthrobacter roseus (Bidle et al. 2007). Relatively younger viable bacteria which are 3.5 million years could also be isolated from Eastern Siberia. Sample examination detected various archaea, phototrophic cyanobacteria, algae, fungi, and even protozoa in addition to heterogeneous bacterial species in the samples. The isolated bacteria belonged mainly to gram-negative members. The majority of isolates could be identified as Arthrobacter phenanthrenivorans, Subtercola frigoramans, and Glaciimonas immobilis (Zhang et al. 2013).

Meanwhile, viable and highly robust 3.5-million-year old strains of Bacillus sp., including Bacillus cereus and Bacillus anthracis, were reported (Nicholson et al. 2000; Fursova et al. 2012). The dominance of spore-forming bacteria in ancient Canadian ice samples was also reported. This is attributed to their ability to withstand hard environmental conditions (Steven et al. 2007).

On the other hand, microbiological examination of 3.5-million-year old samples from Eastern Siberia revealed the absolute dominance of microbial members of three phyla Bacteroidetes, Proteobacteria, and Firmicutes (representing about 99% of the identified bacterial population). In contrast, the remaining 1% was represented by members of Deinococcus-Thermus, Cyanobacteria/Chloroplast, Fusobacteria, and Acidobacteria. In turn, members of the families Chitinophagaceae, Caulobacteraceae, Sphingomonadaceae, Bradyrhizobiaceae, and Halomonadaceae clearly dominated over other microbes (Brouchkov et al. 2017).

Younger samples from Northeast Eurasia (approximately 3 million years old) were also examined. Characterization of the cultured bacteria revealed three major lineages: gamma-Proteobacteria (mainly Xanthomonadaceae), Actinobacteria, and Firmicutes. In addition, various aerobes could be isolated from the ice samples including Actinomycetales (Arthrobacter and Microbacteriaceae); Firmicutes (Exiguobacterium and Planomicrobium); Bacteroidetes (Flavobacterium); and finally alpha- and gamma-Proteobacteria represented by Sphingomonas and Psychrobacter, respectively (Vishnivetskaya et al. 2006). About 30% of the grown bacteria could build endospores. The isolated bacteria from the same location showed variation according to the age of the samples. In contrast, the older samples (up to 3 million years) revealed mainly high-GC gram-positive bacteria; in addition to beta- and gamma-Proteobacteria, younger samples from the region (up to 8000 years) contained mainly low-GC gram-positive bacteria (Shi et al. 1997). At the same time, the microbial diversity of younger samples clearly increased, while the prevalence of spore-forming bacteria in the microbial population decreased. The same findings were also observed in ice samples originating from Siberia, Canada, and Norway, where the spore-forming bacteria (mainly Clostridia and Bacilli) were more prevalent in ice layers (up to 33,000 years old), while non-spore-forming species dominated in older samples (about 600,000 years old) (Liang et al. 2019).

Identification of other forms of life

The melted ancient ice samples contain not only viruses and bacteria but also fungi, amoeba, nematodes, and even arthropods. In 2013, a mycological examination of ancient Siberian permafrost sediment detected different fungal species which were viable and metabolically active (Zhang et al. 2013).

Similarly, various viable amoebae strains representing unknown species from the genus Flamella (Amoebozoa, Variosea) could be isolated from frozen Arctic samples. Although the amoebae cysts were conserved over thousands of years in frozen ice, they kept their viability and ability to divide (Shmakova et al. 2016). Similarly, examination of 30,000 to 40,000-year-old permafrost deposit samples could also detect viable nematodes (Panagrolaimus aff. Detritophagus (Rhabditida) and Plectus aff. Parvus (Plectida)) (Shatilovich et al. 2018). They were found to be very tolerant to hard environmental conditions and low temperatures up to − 80 °C (Kagoshima et al. 2012). In addition, ice samples from Antarctica harboured freeze-tolerant arthropods such as the midges Belgica antarctica and Eretmoptera murphyi (Teets and Denlinger 2014).

In conclusion, the consequences of global warming on international public health are still underestimated. The climatic changes have now been shown to influence various aspects of human and animal health and represent a serious threat to the existence of humanity.

#### Thawing permafrost is a unique threat because humans likely lack immune responses

Christian Sonne, 2024 – a professor in the Department of Ecoscience at Aarhus University in Roskilde, Denmark. “Join forces to counter Arctic pandemic threat” Nature, 9/5, v 633, accessed via University of Michigan databases //DH

The Arctic is under stress, that much is known. Between 1979 and 2021, the region warmed four times faster than the global average, with effects — as yet poorly understood — on its ecology and ability to store carbon, on global sea levels and on wider ocean-circulation and weather patterns.

Add in the effects of biodiversity loss and pollution, and people often refer to a triple planetary crisis. I think we should actually be talking about a quadruple crisis. Since starting research in the Arctic in 1997, I have spent nearly all of my summers there, monitoring changes in pollution levels, habitats and food webs using a ‘One Health’ approach that integrates effects on wildlife, humans and ecosystems. And it’s becoming clear that, as the Arctic warms, its environment degrades and human activities increase, new health threats are emerging. In particular, the Arctic is likely to become a hotbed for zoonotic diseases that spill over into humans from other animals. That threat was brought home to all of us by the COVID-19 pandemic. We need to take seriously the possibility that the next pandemic could come from the north.

Some 60% of emerging infectious diseases are zoonotic. Their emergence and spillover is in general highly interlinked with habitat degradation, biodiversity loss and foodweb changes — all of which are present in the Arctic. But a warming Arctic harbours other risks. As sea ice thaws, ‘forever chemicals’ are increasingly being transported into Arctic environments. These include mercury, per- and polyfluoroalkyl substances and polychlorinated biphenyls, all known to modulate human and animal immune systems and increase vulnerability to respiratory infections. Invasive fish and whale species are also bringing in industrial chemicals and their own diseases.

The pathogens enter an environment in which some native species, such as polar bears (Ursus maritimus), have not been exposed to them, and so are at increased risk. The release of ancient microorganisms long frozen in ice and sediments as the landscape thaws adds to this danger: humans and other wildlife are likely to lack any immune defences against them.

These risk factors are set to increase. The first ice-free Arctic summers could come as early as the 2030s. The Arctic Ocean has huge potential for energy, fishery and tourism sectors, and is not subject to any global treaty regulating its exploitation. Further wildlife disturbance, pollution, overfishing and jurisdictional conflicts are the likely result.

The current perception is that the Arctic possesses relatively low microbial activity. Compared with temperate and tropical latitudes, many fewer resources are devoted to studying zoonoses in the Arctic, with sparse surveillance for emerging threats in most areas. This needs to change — taking account of human, animal and wider environmental perspectives.

#### The sheer number of new microbes released makes it a risk

Corey J. A. Bradshaw and Giovanni Strona, 2023 - \*Matthew Flinders Professor of Global Ecology and Models Theme Leader for the ARC Centre of Excellence for Australian Biodiversity and Heritage, Flinders University, AND \*\*Doctoral program supervisor, University of Helsinki “Ancient pathogens released from melting ice could wreak havoc on the world, new analysis reveals” The Conversation, 7/27, <https://theconversation.com/ancient-pathogens-released-from-melting-ice-could-wreak-havoc-on-the-world-new-analysis-reveals-209795> //DH

More recently, scientists found remarkable genetic compatibility between viruses isolated from lake sediments in the high Arctic and potential living hosts.

Earth’s climate is warming at a spectacular rate, and up to four times faster in colder regions such as the Arctic. Estimates suggest we can expect four sextillion (4,000,000,000,000,000,000,000) microorganisms to be released from ice melt each year. This is about the same as the estimated number of stars in the universe.

However, despite the unfathomably large number of microorganisms being released from melting ice (including pathogens that can potentially infect modern species), no one has been able to estimate the risk this poses to modern ecosystems.

In a new study published today in the journal PLOS Computational Biology, we calculated the ecological risks posed by the release of unpredictable ancient viruses.

Our simulations show that 1% of simulated releases of just one dormant pathogen could cause major environmental damage and the widespread loss of host organisms around the world.

Digital worlds

We used a software called Avida to run experiments that simulated the release of one type of ancient pathogen into modern biological communities.

We then measured the impacts of this invading pathogen on the diversity of modern host bacteria in thousands of simulations, and compared these to simulations where no invasion occurred.

The invading pathogens often survived and evolved in the simulated modern world. About 3% of the time the pathogen became dominant in the new environment, in which case they were very likely to cause losses to modern host diversity.

In the worst- (but still entirely plausible) case scenario, the invasion reduced the size of its host community by 30% when compared to controls.

The risk from this small fraction of pathogens might seem small, but keep in mind these are the results of releasing just one particular pathogen in simulated environments. With the sheer number of ancient microbes being released in the real world, such outbreaks represent a substantial danger.

#### New diseases will spread quickly from the Arctic

Valerie Brown, 2024 – science writer based in Oregon. She has covered environmental health, climate, nuclear waste, and microbiology, among other subjects, receiving an explanatory journalism award from the Society of Environmental Journalists “A rising danger in the Arctic” Bulletin of the Atomic Scientists, 11/25, <https://thebulletin.org/2024/11/a-rising-danger-in-the-arctic-microbes-unleashed-by-climate-change/> //DH

Humans living in the Arctic have in recent centuries built their residences, businesses, and other infrastructure atop permafrost, which served as a sort of perpetual foundation. Now, as climate change proceeds, permafrost is collapsing across the North, destroying water systems, roads, buildings, and pipelines and leading to contamination of areas humans use. Permafrost collapse generates new lakes that can join up with surface streams and carry microbes into the ocean. Open-pit mines, eroded bluffs, and sinkholes expose ancient organic matter. In addition to bacteria and viruses, fungi, lichens, and even nematode worms have been revived from permafrost. So while there is some reason to avoid panic about zombie microbes, humans do face the possibility of meeting up with the vast, newly exposed microbial storehouse released from permafrost.

Potential pathogens could move into and out of the Arctic in multiple ways. Ships’ ballast water transports invasive species, including microbes. Animal carriers, especially rodents like beaver, rats and rabbits, bring southern pathogens like giardia, rabies, toxoplasmosis, and hantavirus northward, while marine mammals and birds migrate great distances north and south, traversing the Arctic, Pacific and Atlantic oceans distributing bacteria, viruses and fungi. And as resource extraction rises, more workers move between weeks-long shifts in the Arctic to urban areas in more southerly regions, often using air transport.

## Arctic Diplomacy Advantage

### They Say: “Russia says no”

#### Russia will agree to US science cooperation within the Arctic Council working groups

Meduza, 2025 - a Russian- and English-language independent news website, headquartered in Riga, Latvia. The article interviews Illa Shumanov, the director of the Arctida project, non-profit organization focused on analysis and investigation within the Russian Arctic, and Arild Moe, Senior Research Fellow at the Fridtjof Nansen Institute (Norway). “Breaking the ice As the U.S. and Russia tease Arctic cooperation, climate science could offer common ground — but neither side seems interested” 4/22,

<https://meduza.io/en/feature/2025/04/22/breaking-the-ice> //DH

Indeed, while Trump has yet to deliver the swift peace in Ukraine he once promised, talk of U.S.- Russia cooperation in the Arctic has expanded into ambitious (if vague) proposals — potentially spanning everything from trade routes to energy development projects, according to Trump envoy Steve Witkoff. But even amid the attempted rapprochement between Washington and Moscow, serious obstacles to Arctic cooperation remain.

As Arild Moe, research professor at the Fridtjof Nansen Institute, told Meduza, while Trump may have grand ideas about U.S. companies getting involved, he doesn’t have the power to dictate strategic decisions to private American firms the way Putin does to Russian state-owned companies. “There’s no deal that can commit American business to investments in Russia happening overnight,” Moe said. For any of this to be plausible, the risks would have to be manageable — and right now, Moe said, “long-term investments in Russia look quite risky because the economic [and] political situation is unpredictable.”

Even if sanctions were lifted, “American companies don’t seem particularly eager to return to the Russian market right now,” Shumanov concurred. There’s also the matter of nationalization, which the Kremlin has been actively using to seize foreign-owned assets since the full-scale war began. As Shumanov put it, when Trump leaves office, “Vladimir Putin, if the mood strikes him, could easily sign another decree nationalizing the next enterprise.”

With joint business ventures still difficult to justify — and military cooperation all but unimaginable — Shumanov believes the most realistic area for actual engagement is environmental science. “Joint climate research, coordination, disaster prevention — that kind of collaboration could start tomorrow, even with major political differences,” he told Meduza. “Russian and American scientists and climate experts could meet through Arctic Council working groups and begin working together.”

The Arctic Council — an intergovernmental forum focused on scientific and environmental cooperation — has managed to survive not only Russia’s full-scale invasion of Ukraine but also Finland and Sweden’s accession to NATO, which left Russia the lone non-NATO country in the Arctic Circle. “It was almost on its deathbed,” Moe said, “but it seems that all parties wanted it to remain.”

Still, he said, “the level of contact and cooperation within that framework is at a very low level today” — though he acknowledged that international interest coupled with concern for the region’s vulnerability could lead to renewed cooperation.

#### Putin has already said yes

Vladimir Putin, 2025 – President of Russia. Address to a Plenary Session of the 6th International Arctic Forum “The Arctic: Territory of Dialogue international forum” 3/27, <http://en.kremlin.ru/events/president/news/76554> //DH

Russia is the largest Arctic power. We have consistently advocated for equitable cooperation in the region, encompassing scientific research, biodiversity protection, climate issues, emergencies response, and, of course, the economic and industrial development of the Arctic. We are prepared to collaborate not only with Arctic states but with all who, like us, share responsibility for ensuring a stable and sustainable future for the planet and are capable of adopting balanced decisions for decades to come.

Regrettably, international cooperation in northern latitudes is currently facing significant challenges. In the past few years, numerous Western nations have opted for confrontation, cutting off economic connections with Russia and ceasing scientific, educational, and cultural exchanges. Discussions on safeguarding Arctic ecosystems have come to a standstill. Politicians, party leaders, and even the so-called greens in some Western countries address their citizens and electorates about the significance of the climate agenda and environmental conservation, yet in practice, their policies are entirely contradictory.

As a reminder, the Arctic Council was set up to cooperate in addressing environmental issues, to prevent emergencies above the Arctic Circle and to jointly respond to them if they emerge. However, this tool has degraded by now. Meanwhile, Russia did not refuse to communicate in this format – it was the choice of our Western partners, Western nations. As they say in such situations: Don’t do it if you don’t want it. We will work with those who want it.

#### Russia’s national Arctic Strategy prioritizes the Arctic Council despite isolation

Margaret Williams, et al 2024 - Arctic Initiative Senior Fellow at the Harvard Kennedy School’s Belfer Center for Science and International Affairs “Mapping a Path Forward for Arctic Cooperation with Russia: A Biodiversity Case Study” THE FLETCHER FORUM OF WORLD AFFAIRS, VOL.48:1, WINTER 2024, [https://static1.squarespace.com/static/579fc2ad725e253a86230610/t/6621323903e2791252a32b36/1713451577715/Mapping+a+Path+Forward+for+Arctic+Cooperation+with+Russia.pdf](https://static1.squarespace.com/static/579fc2ad725e253a86230610/t/6621323903e2791252a32b36/1713451577715/Mapping%2Ba%2BPath%2BForward%2Bfor%2BArctic%2BCooperation%2Bwith%2BRussia.pdf) //DH

Although Russia disdains some multilateral fora (recently bristling at UNESCO’s focus on an imperiled Russian World Heritage Site as having a “political orientation” imposed by Western nations25 and withdrawing from the Barents-Euro Arctic Council in September 2023),26 the Putin administration appears to remain committed to the Arctic Council. Indeed, just before the hand-off of its duties as chair of the Arctic Council to Norway,27 Russia amended its national Arctic Strategy and continued to affirm the Arctic Council’s leading role in overseeing international activities in the region.28

Under Norway’s leadership, a new approach is now cracking open a door for dialogue on Arctic Council projects that include Russia.29 All Arctic states, in consultation with the permanent participants, have agreed by consensus on new guidelines for decision-making via written procedure, an approach that is permissible under the Arctic Council’s existing operating guidelines.30 Such a process is likely to be more time-consuming and cumbersome than face-to-face communication. However, it at least establishes a means for all Arctic countries to communicate with each other and has allowed for the resumption of Arctic Council activities.

In a media interview, the Norwegian Chair of the Senior Arctic Officials, Morten Høglund, acknowledged Russia’s apparent interest in remaining part of the organization, noting that “when needed, we have contact and meetings with the Russian side and the conversation is constructive… and the other countries are interested in resuming the Council’s work.” 31

#### Russia has highlighted the possibility of cooperation over climate change at recent conferences

Pavel Devyatkin, 2025 – senior fellow at the Arctic Institute “Restoring Arctic Exceptionalism” Conference Transcript, 6/12, https://quincyinst.s3.amazonaws.com/wp-content/uploads/2025/06/15150043/Restoring-Arctic-Exceptionalism-Transcript.docx.pdf //DH

Thank you, Cynthia. Yeah. At first glance, cooperation between the US and Russia can be good for trust building, for diplomacy, but we've only really heard opportunities in the areas of oil and gas, natural resources, rare earth minerals. That raises a lot of concerns that the climate crisis and common interest over thawing permafrost, wildfires in both the Russian and American Arctic regions, are going to be forgotten.

There is no reason that the US and Russia can't include climate change in its collaborative platform. The US and Russia have perhaps even a centuries-long history of working together in the Arctic in scientific collaboration, especially. Some historians think that Benjamin Franklin wrote to his Russian polymathic counterpart in 1765, Mikhail Lomonosov, asking for Lomonosov's account of his journey to the Russian Arctic, to ask for his scientific discoveries on that journey that was funded by Peter the Great.

Even in the Cold War, we had high levels of agreements on environmental protection, conservation of polar bears. There is no reason that climate change should not be included in. In fact, it's crucial for American scientists to understand what's happening in the Russian Arctic. One geophysicist in the University of Alaska said that trying to understand Arctic climate change without having data from the Russian sector of the Arctic is like taking two wheels off your car and trying to drive home. It doesn't work.

You don't have a full model of how climate change is affecting the region. Cynthia mentioned that I'm an American. I've been living for the past few years in Moscow, and from the Russian side, we do see some interest in including climate change in the US Russia cooperation in the Arctic. Just in March of this year, Putin's envoy, Kirill Dmitriev, at the International Arctic Forum in Murmansk in the Russian Arctic, gave an interview to BBC News, where he emphasized that climate change will need to be a key part of US-Russia Arctic cooperation.

Kirill Dmitriev had before focused on the opportunities for economic cooperation, but the fact that Russian side is mentioning climate change as a part of US-Russia cooperation should be considered. I'm not sure how that's going to be received, given the current administration, but it's something that we can consider. In terms of science diplomacy, to the credit of our diplomats in the US, diplomats in Moscow, Norwegian diplomats, I've been invited to speak with diplomats in the US Embassy, the Norwegian Embassy.

### They Say: “Arctic Council Fails”

#### Science diplomacy is the bridge that can unify the Arctic Council

Valery Konyshev, 2023 – Professor of Political Science at Saint-Petersburg State University, Russia “Arctic Science Diplomacy: With or Without Russia?” Geneva Centre for Security Policy Strategic Security Analysis, September, Issue 32, <https://www.gcsp.ch/sites/default/files/2024-12/ssa-2023-issue32-arctic-science-diplomacy-with-or-without-russia.pdf> //DH

The development of new technologies has played a role in depleting natural resources and degrading the environment. As a result, the importance of taking knowledge-based political and economic decisions in line with the concept of sustainable development is growing. In the Arctic, science-based decision-making is crucial because:

• Arctic ecosystems are particularly vulnerable to economic activities;

• no state has sufficient financial, technological, nor human resources to explore and develop the Arctic alone;

• the Arctic is sparsely populated and remote from industrial centres; and

• researching the global trends emanating from the Arctic is impossible without international scientific cooperation.

 To overcome the deadlock, science diplomacy can create a “bridge” for finding a reasonable compromise in Arctic policy, despite the Ukraine crisis. According to this view, the Arctic should be considered an exceptional “zone of peace and cooperation”,1 but this exceptional status was lost after the beginning of Russia's military operation in Ukraine in February 2022. Finland's accession to NATO and Sweden’s ongoing application have radically changed the strategic environment and increased the risk of military confrontation. There seems to be a tendency to divide Arctic stakeholders into two roughly equal groups: the NATO-oriented states on one side, and Russia plus China and other states that did not support the sanctions imposed on Russia after its attack on Ukraine. The West has indefinitely paused cooperation with Russia in the Arctic Council (AC), thereby provoking a political stalemate. Norway’s chairmanship of the AC during 2023-2025 does not promise any reconciliation, because its agenda does not even mention the Ukraine crisis.2 To overcome the deadlock, science diplomacy can create a “bridge” for finding a reasonable compromise in Arctic policy, despite the Ukraine crisis. Science diplomacy played this role during the Cold War by supporting various types of dialogue between the United States and the Soviet Union. In the current situation it could also improve international relations and support multilateral efforts to address common problems, including climate change, in the Arctic.3

#### The Arctic Council can survive Trump by downplaying geopolitics under Denmark’s leadership

Astri Edvardsen, 2025 - Adviser at the Nord University Business School of Nord University. “The US Can Become More Unpredictable on Climate Issues in the Arctic Council Than Russia” High North News, 4/29, translated by Birgitte Hansen, <https://www.highnorthnews.com/en/us-can-become-more-unpredictable-climate-issues-arctic-council-russia> //DH

A glimpse of light

Keeping the Arctic Council together while strengthening its functioning will likely require a great deal of effort.

At the same time, there are several indications that it will go well, despite current and expected turbulence, as the FNI researcher sees it today.

"I believe that there are still many reasons to be optimistic regarding the Arctic Council's future, for now. The Council, having survived so far, is due to the cooperation being beneficial for all eight Arctic states. This is a point of reference in itself," Andreeva points out and continues:

"Another reason for hopefulness is that although the Arctic Council is primarily aimed at research work, the Council has a symbolic position which has so far been important for all Arctic states to hold on to. Cooperation in the Arctic Council also serves as a counterweight to non-Arctic interests in the North and is possibly a forum where such interests can be kept in check."

"A central optimism cue is also that Arctic Indigenous organisations have a place at the table as permanent participants in the Council, something the Kingdom of Denmark also emphasized when launching its priorities. This is in itself a clear signal that the Arctic is not a 'no man's land' without governance, but a managed region of national and local significance. We will see how Trump's USA responds to this."

Focus on the tangibles

Faced with waves in the wake of the Trump administration, the solution may be to keep a steady eye on the Council’s tangible work, Andreeva says.

"During Trump’s previous presidency, the strategy within the Council was to sit tight, and a similar approach has been taken in the face of geopolitical tensions since Russia’s full-scale invasion of Ukraine."

"It is conceivable that we will continue to see an approach in the Arctic Council that focuses on the very concrete and issue-specific, while downplaying the geopolitical. The priorities of the Kingdom of Denmark lay the foundation for making this possible," she states.

#### The plan signals a policy shift that aligns the United States with Denmark’s Arctic Council agenda

Dr. Michael Wenger, 2025 – CEO of the Polar Journal “Denmark and Greenland Navigating Arctic Geopolitics as Diplomatic Icebreakers” The Polar Journal, 5/14, <https://polarjournal.net/denmark-and-greenland-navigating-arctic-geopolitics-as-diplomatic-icebreakers/> //DH

**Motzfeldt = Greenland’s Minister of Foreign Affairs, currently the chair of the Arctic Council**

However, the diplomatic waters are perilous. The primary disruption stems from Russia’s 2022 invasion of Ukraine, which led Western Arctic nations to largely suspend cooperation with Moscow. This resulted in a significant pause in many joint Council activities and Russia subsequently withdrew its financial contributions to the Council’s budget. While some expert-level working groups cautiously resumed activities in 2024, allowing for continued scientific collaboration, broader political cooperation remains significantly constrained. Analysts note that while Norway managed to maintain certain minimal channels of communication with Russia on Arctic matters, this approach may prove more challenging for Denmark given a different history of bilateral Arctic engagement.

Adding another layer of complexity are the strategic interests of the United States in the Arctic. The current U.S. administration has openly discussed Greenland’s geopolitical significance, issued threats and massive criticism towards Denmark and its handling of the topic. Minister Motzfeldt has addressed this, stating that regarding security, “both Nuuk and Washington are aligned,” and further clarified Greenland’s position by emphasizing that while Greenlanders “don’t want to be Danes, they also don’t want to be Americans,”. Yet, she also underscored a commitment to cooperation with the current U.S. administration on shared security responsibilities. Nevertheless, the potential for shifts in U.S. Arctic policy, particularly concerning climate change and indigenous affairs – key priorities for the Danish-Greenlandic chair – remains a dynamic factor.

Despite these formidable challenges, the Arctic Council continues to be viewed by its members as an indispensable, albeit tested, platform for dialogue. As Denmark and Greenland guide the Council, their leadership will be crucial in fostering resilience and maintaining channels for communication. Their stated focus on “dialogue, cooperation, and respect” as “essential for long-term peace, security, and stability in the Arctic” will be paramount as they endeavor to break through the geopolitical ice confronting the High North.

### They Say: “Science Diplomacy Fails”

#### Arctic science diplomacy is unique – the Arctic Council provides legitimacy that reduces politicization

Serafima Andreeva, 2023 - researcher at the Fridtjof Nansen Institute. Her work explores the production and translation of scientific knowledge “Science at Stake – Russia and the Arctic Council” Arctic Review on Law and Politics, May, <https://arcticreview.no/index.php/arctic/article/view/5455/8707#toc> //DH

**AC = Arctic Council, ACIA report = Arctic Climate Impact Assessment**

The ACIA report is one of many examples of how the knowledge produced by the Council has achieved political traction. The AC has contributed to several environmental conventions affecting national and international environmental policy. During the interviews with AC members 1 and 2, they explained the success stories of the Stockholm Convention and the Minamata Convention, which are examples of how Arctic scientific knowledge directly impacts political action.61 The idea of scientists as translators, suppliers, and brokers of knowledge was also prominent in the Minamata Convention, as the AMAP working group took an active part in the processes leading up to international negotiations on the convention.62

The second dimension of scientific cooperation in the Council is the importance of researcher networks.63 The maintenance of researcher networks in the AC gives individual scientists a sense of belonging to the work and fields of their colleagues. As the AC is an arena that intertwines knowledge creation and decision-making, the translations that happen internally in the working groups rely on translations between science and policy, and vice versa.

Thirdly, the lack of binding obligations is partly responsible for giving the Council its political legitimacy and the opportunity to lift necessary knowledge to the level of international conventions. The non-binding principle of the Council protects scientific integrity through its partial separation from obligations in policy fields, and the working groups gain the freedom to provide precise policy recommendations:

I think the Arctic Council is very important in the sense that it has not been politicized, that it does not come with many binding agreements because they would have been diluted, right? It would be thin soup. […] The recommendations of the working groups that are at a lower political level can be quite precise, right? Then you can do something because it is at a management level. (Expert Interview 1, 2022)

The most important thing for us is the principle of scientific integrity. We emphasize that our reports are scientific and represent the view of the experts and not the Arctic Council nor the views of the working groups as such. It’s important to act as a legitimate, scientific body. (AC Member 2, 2022)

In these interviews, two levels of importance are presented for the scientific legitimacy of the AC: the principle of scientific integrity, and the ability to provide non-diluted recommendations. Even though knowledge production in the AC working groups is incentivized by a level of disconnect between science and policy, the fields of science and policy are not entirely separated. This intertwining is visible in the relationship between the Council’s three levels, as consensus is required for decisions to be made, and the mandate in the working groups is received from senior Arctic officials and ministerial meetings.64 However, by emphasizing the separation of the scientific reports from the official views of the Council, AC Member 2 illustrates room for legitimacy through depoliticization.

Analysis of the interviews reveals that the co-production of scientific knowledge in the Council operates across three dimensions, namely: researcher networks, translation of scientific knowledge between science and policy, and scientific integrity. All aspects of the co-production and outreach of Arctic climate science affect each other, as active researcher networks enable possibilities for knowledge translation to the field of policy, and depoliticized scientific integrity contributes to the legitimacy of the translated knowledge and creates room for cooperation through international researcher networks in the AC.

### They Say: “No Arctic War”

#### Buildups in conventional and nuclear forces, increased threat perceptions, and multipolarity erode Arctic deterrence

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Arctic security can be characterised as a nexus between multipolar nuclear conflict and climate change. Multipolarity is defined as a global balance of power between multiple actors [3]. Climate Change is making seaways and resources more accessible, which is leading to a thawing of territorial conflicts which were formerly frozen [4]. China’s increasing economic interests in the Arctic means it must be considered as a regional actor despite its near-regional status [5]. Russia has recently threatened to use nuclear weapons against the United States (U.S.) due to its objections to Russia’s invasion of Ukraine; this sets a precedent for heightened nuclear tension in the Arctic, which is the most nuclearized area in the world and has seen a steady buildup of nuclear and conventional forces by regional actors [6]. These factors have led to direct tensions between three major nuclear actors (namely, NATO, China, and Russia) in a region that is becoming increasingly competitive [7]. These tensions cannot be adequately explained by existing deterrence models, which rely on Cold War-era bipolar game theory [8]. Due to climate change, geopolitical tension, and the Russian invasion of Ukraine, nuclear relations in the Arctic are unstable and present serious security risks that cannot be contended with through the use of classic deterrence theory [9].

Arctic Governance and Climate Change

The Arctic region is 66.5° north of the equator and encompasses the United States, Canada, Finland, Sweden, Denmark, Norway, Russia, and Iceland, all of whom are members of the region’s governing body, the Arctic Council [10]. The region’s international legal status currently lies under the United Nations Convention for the Law of the Sea, however, due to climate change, polar ice is melting, making the region more accessible by sea and opening up its vast oil and gas deposits for extraction by regional actors [11].

Sino-Russian cooperation along sea routes has given China significant influence in the region, which it wants to develop into a “Polar Silk Road” as outlined in its 2018 Arctic White Paper [12]. Chinese development interests do not align with Russia’s geopolitical goals in the Arctic, and China’s ownership over Arctic infrastructure represents an economic threat to Russian interests [13]. There is growing competition between these regional actors which is exacerbated by overlapping territorial boundary claims by Denmark, Canada, and Russia. In addition, the Arctic Council has suspended cooperation due to its chairmanship by Russia until the end of 2023 [14].

Deterrence and Arctic Nuclear Relations

Classic nuclear deterrence is steeped in Cold War bipolarity and relies on two rational actors basing their decisions on what they believe their opponents' actions will be [15]. Classic deterrence is expressed through the Chicken Game [16]. As seen in the figure below, a player’s options are to defect and pursue a foreign policy objective or to cooperate and maintain the status quo [17]. The best outcome for an actor is to defect against a cooperating partner; however, this runs the risk of both players defecting, leading to nuclear annihilation [18].

This classic deterrence game does not contend with the possibility of conflict between multiple nuclear actors, which is a key feature of Arctic security [19]. Though a three-player chicken game has been applied to theoretical problems, such as two out of three players needing to complete a task that all would rather not complete, this model has yet to be applied to nuclear relations [20]. China, NATO, the U.S., and Russia’s nuclear doctrines are informed by deterrence theory, which is problematic due to the theory’s assumption of a bipolar world order [21].

Nuclear multipolarity in the Arctic is unstable because it no longer falls within the traditional game theory matrix, and there is an increased risk of nuclear action due to a larger number of nuclear actors and significant regional tension [22]. Preemptive nuclear strikes are more prevalent in multipolar nuclear politics due to a greater perception of threat from other actors [23]. Though China promotes itself as a No First Use (NFU) state, meaning that it will not strike unless struck upon in a nuclear capacity, Russia has threatened to strike first, and America’s position on NFU is vague [24]. NATO is a nuclear deterrent organisation in the Arctic region, only Sweden is not yet a full NATO member and Finland has just recently gained NATO membership [25]. In multipolar deterrence, regional conflicts are more likely to escalate into total nuclear warfare, and de-escalation relies on political bargaining as opposed to rationality modelling. Thus, it is unclear how political bargaining will take place in an increasingly polarised Arctic [26].

Though the U.S., China, and Russia have all acceded to or ratified the Treaty of the Non-Proliferation of Nuclear Weapons (NNPT), both Russia and the U.S. have backed out of data-sharing obligations under the New START treaty [27]. This breakdown in communication between Arctic actors due to Russia’s invasion of Ukraine, and Russia’s recent threat to use nuclear weapons against the U.S. indicates that future regional disputes over Arctic resources, navigation, and territory may give rise to nuclear crises [28].

#### Tensions are at an all time high – hybrid operations and arms races destabilize the Arctic, but Arctic Council diplomacy can solve

Bipandeep Sharma and Uttam Sinha, 2024 - Dr Bipandeep Sharma is Research Analyst with the Non-Traditional Security Centre, at MP-IDSA, New Delhi. Dr Uttam Kumar Sinha is Senior Fellow and heads the Non-Traditional Security Centre at MP-IDSA, New Delhi. “Hot Stakes in the Arctic: Global Rivalries and New Geopolitical Forces” Strategic Analysis, 2024 Vol. 48, No. 6, 578–587, Taylor and Francis, accessed via University of Michigan //DH

The Arctic, so exquisitely remote, seems at times to drift beyond the reach of global politics. In this frigid expanse, the Arctic Council, an intergovernmental forum standing as a rare bridge, kept its most formidable of rivals—Russia and the US—together, compelling the two to cooperate even as they continued to lock horns elsewhere. It seemed almost too good to be true. The enduring East-West peace once held in the Arctic has come under unaccustomed strain due to the Russia-Ukraine conflict, disrupting governance, research and economic activity while challenging decades of practical and operational cooperation across the region’s vast landscapes and seascapes spanning the northern reaches of North America, Europe and Asia. The irony is even more striking as the Arctic States have no direct territorial or sovereignty disputes in the region. Threat perceptions between Russia and the Arctic Seven—Canada, Denmark, Finland, Iceland, Norway, Sweden, and the United States —are now at an all-time high, particularly in the wake of NATO’s recent expansion, casting a long shadow over Mikhail Gorbachev calling the Arctic as a ‘zone of peace’ in his speech in Murmansk 1987. Non-traditional security issues like climate change, sustainable resource development and the concerns of the indigenous community now teeter on the edge of renewed rivalry, military posturing and strategic interests. In examining the intricate geopolitical strands in the Arctic, this Essay looks at how India—as a non-Arctic State, with independent diplomatic ties with both Russia and the NATO-aligned Arctic Seven—positions its interests in the High North. The analysis posits that, despite the Arctic States’ divergent geopolitical priorities, there is a need to restore a degree of lost cooperation. In this context, a renewed faith in ‘Arctic Science’ emerges as a compelling diplomatic tool, a neutral collaborative platform capable of bridging divides, rebuilding trust and carving out a credible pathway for addressing the Arctic’s most pressing challenges.

Arctic geopolitics: post Ukraine

While Gorbachev’s ‘zone of peace’ may be idealized, the Arctic, not to forget, has been historically a silent yet crucial frontier in the great power game. From the battle lines of the First and Second World Wars to the shadowy tensions of the Cold War and its aftermath, this icy expanse has never drifted far from the States’ strategic calculations.1 Its value lies not only in enabling resilient wartime supply routes but also in supporting critical sub-sea operations beneath its frozen surface, and serving as a launch pad for missile defence and deterrence. These factors, till the end of the Cold War in 1989 kept the region in a state of simmering military interest, if not outright confrontation.

The post-Cold War era saw a thaw in Arctic relations, particularly with the formation of the Arctic Council in 1996. For nearly two decades, cooperation among Arctic States flourished, promising a new chapter of stability until this fragile equilibrium was undermined on 24 February 2022, with the onset of the Russia-Ukraine conflict. All Arctic Council-related activities were temporarily suspended, combined with the erosion of East-West cooperation, including Russia withdrawing from the Barents Euro-Arctic Council and the Council of the Baltic Sea States, which have frayed the delicate fabric of Arctic’s governance and security.

It cannot be denied that the Ukraine conflict has intensified military focus in the Arctic, with NATO at one end and Russia on the other, each side recalibrating defence strategies and ramping up military presence and infrastructure. Moreover, China and Russia’s reiteration of increasing cooperation in the Arctic is heightening concerns among the NATO Arctic Seven. Consequently, NATO has rolled out its new ‘Regional Plan North’ that oversees the defence of the Atlantic and European Arctic. Protecting its northern flank and securing its vital sea routes, the plan falls under the command of the newly established Allied Joint Forces Command in Norfolk, Virginia. A decade ago, the idea of Finland and Sweden joining NATO seemed almost unthinkable. Today, their accession has altered the balance of power in the Arctic. NATO, once confined to its traditional borders, now stretches far beyond its previous reach, expanding Arctic land border with Russia from a mere 196 km vis-à-vis Norway to a formidable 1,340 km—a shift that has sparked a flurry of military build-ups on both sides with new bases, larger and more frequent military exercises, and the weaponization of hybrid tactics. Drone strikes in Russia’s Murmansk region, GPS jamming, targeting undersea cables and pipelines, border fences, and airspace violations have all become the new normal. What does this new reality mean for the future of the Arctic? The increased NATO presence along Russia’s border is not merely a logistical shift; it is a game-changer that redefines power structures and prompts a re-evaluation of military strategies in the region. The expansion brings both opportunities and risks—opportunities for enhanced security and cooperation among NATO members, and risks of further escalating tensions with Russia, whose own interests in the Arctic are vast and deeply entrenched. The gains of the post-Cold War period of peace dividends and institution building now seem like a distant memory.

The strategic situation has quickly mutated into a new configuration. In line with the NATO’s 2014 guidelines, the Nordic nations with steadfast commitment are aspiring for contributing 2 per cent from their GDPs towards meeting the alliance’s continued military readiness.2 US defence manufacturing companies have seen a surge in orders, as the demand for advanced military hardware from these Nordic States skyrockets. According to US official reports from 2023, the country’s trade figures for foreign military sales reached US$ 80 billion, a total that includes both sales and grant assistance.3 This arsenal includes cutting-edge systems including short-to-medium range missiles, next-generation fighter jets such as F-35s, precision artillery shells and munitions, and hi-tech surveillance and monitoring equipment.4 It is worth emphasizing that the collaboration is not a one-way street. While the US supports its Nordic partners in upgrading their military infrastructure, Nordic States are leveraging their expertise to help bridge critical gaps in US polar capabilities, particularly in areas like icebreakers and polar-ready vessels.5

A review of recent national policy and strategy documents from the Arctic Seven reveals a strong focus on enhancing strategic and operational cooperation in the Arctic. This emphasis spans bilateral and multilateral partnerships and aligns with NATO’s combined defence framework. To facilitate this operational synergy, many Nordic States have granted US troops unrestricted access to their military bases, further solidifying their commitment to collective security in the region.6 Over the last two years, NATO Arctic States have enhanced the scale and scope of their military exercise, testing their ability to cooperate and coordinate across sea, land and air while preparing troops for real battlefield situations in the Arctic. To boost efficiency in joint operational capabilities, the three Nordic States have agreed to establish an Arctic ‘military transport corridor’. This corridor will allow for the rapid movement of military personnel and equipment from Norwegian ports, through Sweden, and into Finland, strengthening regional readiness and response capabilities.7

On the other side, Russia’s Kola Peninsula, home to two-thirds of its sea-based second-strike nuclear capabilities, has become a persistent target of Ukraine’s hybrid drone attacks in the Arctic. Among the key targets are Russia’s TU-22 and TU-95 bombers stationed at the Olenya Air Base in the Murmansk region, which have been instrumental in launching deep airstrikes in Ukraine. The intensity of military activity in the Arctic reached a dramatic turning point in September 2024. For the first time since 1944, air alarms in Murmansk were triggered not by a military exercise, but by an actual attack—marking a significant escalation in Arctic tensions.

### They Say: “Turn: Fragmented Governance”

#### Russia values its participation in the Arctic Council. Fragmentation only occurs because it’s shut out

Pavel Devyatkin, 2023 – senior fellow at the Arctic Institute “Can Arctic Cooperation be Restored?” 3/28, https://www.thearcticinstitute.org/can-arctic-cooperation-restored/ //DH

Evidently, Russia places great importance on its position in the AC. Russian experts and diplomats have said Russia’s exclusion is counterproductive and irrational. Russian Ambassador to the United States, Anatoly Antonov, and Minister of Natural Resources, Alexander Kozlov, have gone as far as calling it illegitimate and claiming that the boycott violates the principles of consensus given that Russia is the chair of the AC during this period.4) Russian and international scientists have also drawn attention to data gaps that result from cutting off Russian Arctic scientists. Arctic climate research is crucial since warming in the region is a bellwether for global climate change. As such statements demonstrate, Arctic cooperation with Western states is important to Russia, especially in regard to its recognition as a great power.

Russia looking to non-Arctic states?

Instead of cooperation with the West, Russia is increasingly looking to the East and doubling down on collaboration with the U.S.’ strategic competitors such as China. This trend is one of the main consequences of pausing the work of the AC and discontinuing cooperation with Russia. Korchunov has proclaimed that “it is difficult to imagine Arctic cooperation without the participation of Russia [and that] Russia remains open to cooperation, including with non-Arctic states.”5)

Russia’s welcoming of Eastern partners to the Arctic is part of a larger global trend that has been going on for years, but it has been especially noticeable since February as Russia’s diplomats engage with the states of the Shanghai Cooperation Organization, Commonwealth of Independent States, Middle East, Turkey, India, Africa and others. In the Arctic, Russia is welcoming Chinese, Indian, and Middle Eastern companies to invest in projects previously involving Western firms. For example, after Western companies withdrew from the Russian Arctic due to sanctions, Russia’s Novatek is now looking to the Emirati firm Green Energy Solutions to receive important technology to construct liquefied natural gas projects and to the Turkish company Karpowership for a floating power plant.6)

There are increasing signs of Russia-China strategic cooperation in the Arctic. The U.S. Coast Guard unexpectedly encountered Chinese and Russian warships operating together close to Alaska in September 2022.7) A month later at the Arctic Circle Assembly, China’s Special Arctic Envoy, Feng Gao, said that China would not support Norway’s AC chairmanship if Russia was excluded. Feng Gao criticized the interruption of international cooperation due to geopolitical competition and confrontation.8)

The Snowflake international science stations in the Russian Arctic, which were expected to launch at the end of 2024 and become a hub for international research, now seem to be developing into another Russia-China collaboration.9) The cancellation of U.S.-China climate change talks in the wake of Nancy Pelosi’s Taiwan visit may also speed up the process of Russia-China cooperation in climate and environmental research in the Arctic.

However, it must be said that the degree to which a Russia-China partnership exists in the Arctic is still ambiguous. One of Russia’s leading Arctic scientists, the president of Russia’s Arctic Academy of Sciences Valery Mitko, was arrested and charged with allegedly sharing state secrets with China.10) Despite the hype around the Polar Silk Road, there has been no shipping from the Chinese Overseas Shipping Company along the Northern Sea Route since February 2022.11)

#### Current working group meetings disprove the turn. Russia’s committed to working with the Arctic Council

TASS, 2024 – Russian News Agency “Russia seeks to restore situation within Arctic Council — foreign ministry” 3/20, https://tass.com/politics/1931215 //DH

NEW DELHI, March 20. /TASS/. Russia seeks to restore the situation within the Arctic Council, which remains the only platform for multilateral cooperation in the Far North, Director of the Russian Foreign Ministry's Department of European Affairs Vladislav Maslennikov said.

Moscow is committed to an equal and mutually beneficial dialogue in the region, Maslennikov stressed. "In fact, the Arctic Council remains the only platform for multilateral cooperation in the Far North in the current complex geopolitical conditions," he said in a video message to the participants of the Northern Forum - India business and scientific conference held in New Delhi.

The diplomat noted that the effective and non-politicized work of the Arctic Council "is crucial to reach joint solutions in areas like sustainable social and economic development of the Arctic, protection of cultural heritage and rights of indigenous peoples, climate change mitigation and preservation of the Arctic fragile environment."

"Together with Norway's presidency and the Arctic Council Secretariat, we are striving to reestablish the situation within the organization after its full-fledged activity was frozen at the initiative of Western countries," Maslennikov pointed out.

The work of the Arctic Council was suspended on March 3, 2022, but participants resumed written communication in the fall of 2023. In February 2024, the Arctic Council's secretariat said it would resume working group meetings on environmental and safety issues in a virtual format, with Russia at the table. The first meetings were held in the spring and summer of 2024.

The Arctic Council is an intergovernmental organization of the Arctic nations - Denmark (together with Greenland and the Faroe Islands), Canada, Finland, Iceland, Norway, Russia, Sweden, and the United States.

#### Restarting projects in Russia will restore the Arctic Council and reduce fragmentation

Carol Dyck, 2024 – doctoral student Western University, Faculty of Law “On thin ice: The Arctic Council’s uncertain future” Marine Policy Volume 163, May 2024, <https://www.sciencedirect.com/science/article/pii/S0308597X24000587> //DH

7. Conclusion: old principles, new challenges

The current political and economic environment differs greatly from the immediate post-Cold War era that brought opportunities for Arctic States to build trust and collaborate for their mutual benefit. With the potential for great wealth in a newly accessible Arctic, a shift to decidedly more unilateral approaches to the Arctic may occur. Even before the Ukraine war, former US Secretary of State Pompeo’s speech in Rovaniemi engendered more nationalistic individualism than it did the spirit of Gorbachev’s 1987 speech calling for “a genuine zone of peace and fruitful cooperation,86 demonstrating just how far the Member States and Observers have strayed from the principles of the Ottawa Declaration.

Following the 2013 Ministerial Meeting in Kiruna, Sweden, the Council released its Vision for the Arctic, in which the Member States and Permanent Participants stated, “We are confident that there is no problem that we cannot solve together through our cooperative relationships on the basis of existing international law and good will.”87; Russia’s invasion of Ukraine, breaching a key principle of international law, quickly unraveled the goodwill and cooperation that characterized Arctic diplomacy over the past twenty-five years. The “Arctic exceptionalism” bubble burst, leaving many to question the Council’s continued ability to maintain peace and foster constructive dialogue when trust between the Arctic States is severely compromised. Non-Arctic States, like China, may use this opportunity to intensify their calls for global Arctic governance or attempt to profit from the shaky status of the Arctic Council by expanding bilateral agreements with an isolated Russia. As the Ukraine war continues, a quick return to the previous cooperative spirit is unlikely. A void in Arctic governance has emerged when cooperation is most critical.

Whether the Member States wish it or not, change is now inevitable for the Arctic Council. Climate change is forever altering the physical geography of the Arctic, opening a once isolated region to the global economy and intercontinental transportation routes. The North is no longer a peripheral area of international relations; the “new” Arctic will increasingly take center stage in foreign and economic policies. The Council must now adapt both to the unprecedented situation that has stalled its operations, and restructure itself to adapt to the ecological and socioeconomic pressures reshaping the Arctic environment, all while political and military tension threaten to destabilize the region.

The war in Ukraine demonstrated that the Arctic is not immune to complications of high politics and conflict far from its borders. Regardless of the situation in Ukraine, every effort must be made to resume Arctic Council operations with full Russian participation. From a purely scientific perspective, scientists and research institutes have previously noted the loss of scientific mores during periods of conflict and war.88 With the diplomatic fallout of the Ukraine War, the inability for some scientists to engage in field work within Russian territory, along with the freeze in certain projects, is already resulting in “significant gaps” in Arctic research data.89 Additionally, the war increases the critical nature of maintaining cooperation in the Arctic to reduce military posturing and the risk of sparking active conflict; the collaborative atmosphere of the Arctic Council has until now provided opportunities for communication and diplomacy on issues beyond the Arctic through the ups and downs of East-West relations.90 At the start of its Chairmanship Russia reminded the Council that it has worked consistently to guard the Arctic “as the territory of peace, stability and constructive cooperation.”91 It added that Arctic States “carry special responsibility for the future of the region and its inhabitants.”92 This sense of duty should encourage the Member States to find a solution to the current impasse.

A return to the original spirit of Gorbachev’s Murmansk speech could restore the congeniality between the Member States. Rebuilding trust between all the Arctic States is paramount to Arctic Ocean governance; efforts at Arctic conservation can only succeed if the coastal Arctic States, in particular, work together. Member States should revisit the foundation of their Arctic accomplishments, and re-initiate scientific collaboration and knowledge sharing that includes projects in Russia, the largest Arctic State. The Ottawa Declaration, and the Arctic Environmental Protection Strategy (AEPS) before it, could provide the key to renewing goodwill and re-examining the future of Arctic governance. The Council should focus on shared threats and challenges, bearing in mind the Principle of the Common Concern of Humankind, to revitalize peer-to-peer dialogue and collaboration. The threats of climate change in the fragile Arctic environment demand enhanced scientific cooperation “to monitor and improve our understanding of how and to what degree the Arctic climate is changing.”93 Should relations sour even further and Russia choose to exit the Arctic Council, the international community would suffer with the permanent loss of this forum which has furthered understanding of complex ecological processes and assisted in vital policy work. As many have noted, “Russia’s importance, especially for Arctic environmental and climate research, is irreplaceable.”94

While some advisors challenge the possibility of a “return to the pre-war reality”,95 Norway, as Chair of the Arctic Council, is optimistic that relations can be repaired.96 As a focal point for collaboration and cooperation, science can play a critical role in regaining trust, rebuilding diplomacy, and maintaining peace. The AEPS, with its focus on monitoring, assessment, and protection of the Arctic environment, succeeded in bringing the East and West together in the early years following the end of the Cold War. Those same mutual interests, and the less formal venue in which to share knowledge, could bring the Arctic Member States back together again. Time is running out on taking precautionary measures to protect the Arctic. The Arctic environment cannot be sacrificed to realpolitik when a unique opportunity exists to work collaboratively to regulate emergent industries and transportation before potentially irreversible damage occurs. The coastal Arctic states must recognize their shared mutual interest in working together to maintain a regional influence over an Arctic governance that best reflects their goals and concerns. A more accessible Arctic requires strong leadership; a divided Arctic Council simply cannot meet the pressing challenges put before it.

In the twenty-seven years since its creation, the Arctic Council has succeeded in bringing global attention to the fragility of the Arctic and its connection to global ecological systems. As political and economic forces permeate the Arctic, successfully addressing Arctic issues depends on strong alliances and mutual trust between Arctic Council Members, Observers and Permanent Participants. The peaceful relations and cooperation emblematic of the post-Cold War Arctic resulted from the opportunities for dialogue provided by the Arctic Council, even in times of heightened tensions. The more congenial format of the Arctic Council, one not based on rigid legal obligations, has allowed for greater openness, and frank dialogue, sometimes lacking in more formal diplomatic settings. Those channels of communication and cooperation must remain open for the good of the planet and humanity. The Arctic is facing unprecedented challenges; Arctic governance must not disintegrate when robust regulations and transnational peace and cooperation are most urgent.

# Track 2 Counterplan Answers

### 2AC – Track 2 Counterplan

#### 1. Permute do both – it solves best

Vaughan Turekian and Peter Gluckman, 2024 – \*executive director of the National Academies' Policy and Global Affairs Division AND \*\*President of the International Science Council “Science Diplomacy and the Rise of Technopoles” Issues in Science and Technology; Washington Vol. 41, Iss. 1, (Fall 2024): 51-55. Proquest, accessed via University of Michigan //DH

Beyond track 1 and track 2

Another opportunity to make progress in this conflicted space is to consider the potential roles of different actors. Much academic discussion has focused on track 1 diplomacy, or formal diplomacy, suggesting that track 2, or informal, efforts were largely a spillover from scientific cooperation. However, the reality has been more nuanced. Sometimes projects initiated by track 1 players have been enacted by track 2 actors. During the Obama era, for example, the US National Academy of Sciences played an active role in mediating the intended rapprochement with Cuba. Conversely, track 2 activities have led to significant diplomatic achievements. The scientifically led International Geophysical Year of 1957-58 resulted in the Antarctic Treaty. Track 1 and 2 approaches are not separate, but increasingly intertwined.

Inevitably, direct national interests will be primarily driven by the political processes determining economic and security policy. Domestic scientific communities strive to show their relevance to their national funders by supporting such efforts. But at the same time, it has been the global scientific community that has brought attention to climate change, biodiversity loss, pandemic risks, and many other existential threats which require concerted, collective action. In this narrowing window of opportunities to make progress on critically important global goals, track 2 science diplomacy may become even more necessary. For example, the activities proposed for the 2032 International Polar Year, which emphasizes involvement and coproduction of knowledge between a range of Arctic stakeholders, could help to reduce diplomatic tensions and build relationships.

A renewed emphasis on track 2, or a hybrid approach utilizing both tracks, would actually be returning to a role the international science community has often played in history. In the eighteenth century, for example, scientists worked across conflicted nations on issues of common interest, such as gathering measurements of the transit of Venus from multiple sites to estimate the solar unit. But in the current context of rapid change in science when inter-nation tensions are high, track 2 efforts could be an important tool.

#### 2. Permute do the counterplan. It’s an example of how the plan could be carried out because it funds scientists to go to Russia just as the plan does. We don’t fiat that government scientists are the ones to go.

#### 3. Can’t solve Arctic diplomacy – reducing miscalculation requires official participation

Ryan Burke et al, 2025 - Professor of Military & Strategic Studies, U.S. Air Force Academy; Affiliate Professor, Center for Arctic Security and Resilience, University of Alaska Fairbanks “Trump 2.0’s Arctic Opportunity: Thawing Frozen Dialogue” 3/11, <https://www.wilsoncenter.org/article/trump-20s-arctic-opportunity-thawing-frozen-dialogue> //DH

The Biden administration’s 2022 National Security Strategy pledged to restore American leadership on the global stage while tacitly criticizing the previous Trump administration’s self-interested and transactional approach to world affairs. However, when it comes to Russian relations, neither the first Trump nor Biden administrations did anything to rescind Obama’s Kremlin ban. Decreased dialogue between Washington and Moscow only degrades diplomacy, exacerbates tension, and increases the unknowns. Since the beginning of Russia’s invasion of Ukraine in 2014, the global situation has gone from bad to worse. It has become particularly troubling in the Arctic where military and commercial activities continue to increase in scope and scale and where there are no functioning forums—at the official level—enabling Washington and Moscow to deescalate tensions. Absent a structured forum for deescalation, the risk for miscalculation and escalation increases.

The Arctic presents an opportunity for the Trump administration to pursue pragmatic and more open engagement between Washington and Moscow, specifically in the military and security space. Such a forum currently exists at the Track 2 level, but absent official participation from Washington and Moscow decision makers, this forum’s efforts to curtail conflict will struggle.

#### 4. Can’t solve Arctic research - Russia will restrict participation in unofficial forums

Lin Alexandra Mortensgaard, 2023 – PhD Candidate, Danish Institute for International Studies “Arctic climate science is caught in the middle of geopolitical tension” DIIS Policy Brief, 10/6

<https://www.diis.dk/en/research/arctic-climate-science-is-caught-in-the-middle-of-geopolitical-tension> //DH

Research institutions and cooperation between individual researchers have thus been directly affected by the interstate conflict between Russia and Ukraine. This division between ‘Russian’ science and that of the West cuts across disciplines and sub-fields and has serious consequences for natural sciences as well as social sciences and humanities. For climate research in the Arctic, this disrupts data collection, data processing and data sharing, as well as peer feedback, dialogue, and publication processes.

Most concretely, fieldwork in Russia has become impossible as most EU and NATO members have decided to suspend all research projects involving Russian institutions or taking place in Russia. The Russian Arctic constitutes approximately half of the Arctic in terms of coastline and landmass, and it is central to climate change research for a number of reasons. First, the extent and depth of permafrost across Siberia is by far the largest volume in any Arctic state. When permafrost thaws it releases carbon in the form of methane and carbon dioxide, which accelerates global warming. Permafrost thaw cannot be adequately measured by remote-sensing techniques like satellites, drones, or airplanes but must be monitored on and in the ground. Second, melting sea ice on the Russian shelf contributes to overall changes in the Arctic Ocean, and this has potential consequences for the global thermohaline circulation. The monitoring of such processes and the projection of their global ramifications are currently experiencing an irrecoverable gap. Put simply, half of the Arctic climate dataset is currently missing.

The freezing of scientific cooperation also has ramifications for the processing and sharing of data and the publication of scientific results. A number of large scientific projects and consortia, such as INTERACT, a circum-Arctic network of research stations funded by Horizon 2020, are completely reliant on data flowing across borders and between institutions. Such research collaboration, institutional as well as person-to-person, has been fostered since the end of the Cold War. The current halt to data and research sharing thus risks unravelling knowledge infrastructures that have been built over decades. In terms of scholarly debate, dissemination and publication of results, Russia’s war in Ukraine also carries with it serious consequences.

The Russian Ministry of Science and Higher Education has sought to ban Russian scientists from participating in international conferences and has announced an end to promotions based on the indexing of publications on Web of Science and Scopus. From the Western side, it has been argued that Russian scientists should be banned from publishing in international journals. The severing of relations is reciprocal, and it naturally also affects climate science in and on the Arctic. Moreover, it underlines the personal risks that Russian scientists run in continuing scientific collaboration or just informal, personal communications with Western counterparts – a fact that Western climate scientists express concern for, while taking care to maintain a minimum of contact.

#### 5. Track 2 won’t change policy because it doesn’t fiat official government action

Vaughan Turekian and Peter Gluckman, 2024 – \*executive director of the National Academies' Policy and Global Affairs Division AND \*\*President of the International Science Council “Science Diplomacy and the Rise of Technopoles” Issues in Science and Technology; Washington Vol. 41, Iss. 1, (Fall 2024): 51-55. Proquest, accessed via University of Michigan //DH

But even as countries have begun restricting scientific interchange, the world faces common, global challenges that science and technology must address. This obvious paradox points to weaknesses in the previous conception of science diplomacy and explains why responses to global issues such as climate change, sustainability, pandemics, and autonomous weapons have been inadequate. When science diplomacy becomes disconnected from critical national security and economic priorities, it can no longer influence policy. One of the criticisms of the Kyoto Protocol, which required ratifying nations to set individualized targets for greenhouse gas emissions reduction, was that it used an international agreement to drive domestic policy. Although the effort had some success in some countries, it encountered greater difficulty in the United States, where the domestic political consensus for climate action had not been resolved. Under such circumstances, one can build consensus internationally but fail to build it nationally-and national priorities inevitably carry the day.

### 1AR – Can’t Solve Arctic Diplomacy

#### Working through the Arctic Council is essential for effective Arctic diplomacy – it shields science from politicization and gains access to unique researcher networks

Serafima Andreeva, 2023 - researcher at the Fridtjof Nansen Institute. Her work explores the production and translation of scientific knowledge “Science at Stake – Russia and the Arctic Council” Arctic Review on Law and Politics, May, <https://arcticreview.no/index.php/arctic/article/view/5455/8707#toc> //DH

**AC = Arctic Council, ACIA report = Arctic Climate Impact Assessment**

When it comes to cooperating with Russian climate scientists on Arctic matters and to cooperation within the Council, researcher networks were depicted as a core dimension for collaboration. The maintenance of active researcher networks in the AC allows the participating scientists to acquire both a sense of belonging to the organization’s work and unique field knowledge. Despite its value, researchers have encountered obstacles in individual researcher-to-researcher collaborations because of the difficulty in separating institutional connections from individual ties. The participants in this study voiced concerns about the isolation of Russian climate science and the weakening of dialogue with their international colleagues since February 24, 2022. Challenges in network maintenance may also lead to difficulties in accessing Russian data, as several data banks on biodiversity in Russia are not digitally accessible, with access to them relying on individual researchers. The outflow of knowledge and brain drain after the Russian war on Ukraine also threatens to weaken the dimension of researcher networks, leading to challenges in Russian academia similar to those after the dissolution of the Soviet Union.

The dimension of scientific integrity was highlighted in the interviews with members of the AC, epitomized by the non-binding principle of the Council and the partial independence of its working groups. Because reports created by the working groups represent the views of scientists and not the Council, they gain political legitimacy. In addition, the non-legally binding principle of the AC allows for the provision of recommendations that are less diluted and require fewer negotiations. Scientific integrity becomes a prerequisite for trust in international cooperation in the Arctic. Apart from the non-binding principle and scientific independence from the field of policy, the long-term priorities of climate science take part in the dimension of scientific integrity.

### 1AR – Can’t Solve Arctic Science

#### Researcher-to-researcher collaborations fail in practice – they can’t be disassociated from their institutional ties and Russia will restrict data

Serafima Andreeva, 2023 - researcher at the Fridtjof Nansen Institute. Her work explores the production and translation of scientific knowledge “Science at Stake – Russia and the Arctic Council” Arctic Review on Law and Politics, May, <https://arcticreview.no/index.php/arctic/article/view/5455/8707#toc> //DH

**AC = Arctic Council, ACIA report = Arctic Climate Impact Assessment**

Just as Russian scientists encounter difficulties translating their knowledge inside Russia, the Council faces similar challenges due to the freeze in cooperation with their Russian colleagues. The consequences of the pause play out at material and social levels. Researcher networks are only one of the things lost in this lack of translation, as challenges mount in the gathering of data on thawing permafrost, biodiversity, and environmental monitoring from Russian territory. Russian data plays a crucial role in Arctic climate research.65,66 Suspensions of scientific collaboration and lack of access to data after the Russian invasion of Ukraine are worrying scientific communities, and calls to resume cooperation can be heard.67

However, sharing standardized data across borders was challenging prior to the war in Ukraine as well. The collection of data from the Arctic region is known for its resource-intensive processes and rare accordance with international data standards, especially regarding datasets on biodiversity.68 Still, lack of access to Russian data on biodiversity is one of the significant losses of the Council.69 Russia has extensive databases on biodiversity; as most are not yet easily accessible digitally, access by individuals must be relied upon.70 Permafrost is another case that has regularly been mentioned as a significant area of data loss in the AC, and remote sensing through satellite observations has been mentioned as a possible, but not ideal, alternative.71,>72 The gathering of observational data from the circumpolar region on thawing permafrost was formerly challenging as well, partly as a result of the lack of shared data across countries and institutes due to restrictive national policies.73 The use of remote sensing to classify permafrost and wetlands is not new to 2022, and it is one of the priorities of the working group of the Conservation of Arctic Flora and Fauna (CAFF), with the goal of developing a baseline dataset that enables long-term monitoring across the pan-Arctic region.74

The pause in the Council demonstrates how researcher-to-researcher dialogue is an essential condition for producing and making use of scientific knowledge both in and outside the AC. Despite researcher-to-researcher collaborations being possible “on paper,” the reality of the situation is entirely different. It is in practice almost impossible to separate individual researcher contacts from institutional links, especially where the transfer of data is concerned. This throws a wrench in the work of the AC working groups.75 Individual researchers involved in various working group programs become vulnerable as they risk losing researcher networks that have taken time to develop. The long-term risk of weakening researcher networks affects work in the Council and the future of Arctic climate science.

When asked in May 2022 about the role of science in handling climate threats, Arctic Council Member 2 reflected on the potential of scientific independence for building trust.

If one lets science become the basis for building trust, it could be symbolic in resuming cooperation at a scientific level. It could be seen as a strength that the Arctic Council is so flexible that the scientific work could be done despite global conflicts. (AC Member 2, 2022)

The perspective of AC Member 2 on collaboration through scientific integrity confirms its importance, as the scientific independence of the working groups is one of the premises that the Council has been able to foster. The argument of “if one lets science become the basis for building trust” implies the possibility for depoliticized scientific cooperation if conditions allow for it.

#### Too many barriers exist in unofficial diplomacy – using the Arctic Science Agreement is key to overcome them

Valery Konyshev, 2023 – Professor of Political Science at Saint-Petersburg State University, Russia “Arctic Science Diplomacy: With or Without Russia?” Geneva Centre for Security Policy Strategic Security Analysis, September, Issue 32, <https://www.gcsp.ch/sites/default/files/2024-12/ssa-2023-issue32-arctic-science-diplomacy-with-or-without-russia.pdf> //DH

National jurisdiction over Arctic spaces creates another barrier to science diplomacy, e.g. procedures related to visas and permits for foreign scientists to transport equipment and samples across national borders. These procedures can take several months, especially when political disputes between states escalate. The 2017 Agreement on Enhancing International Arctic Scientific Cooperation helps to overcome these difficulties.27

#### That requires going through the Arctic Council

Valery Konyshev, 2023 – Professor of Political Science at Saint-Petersburg State University, Russia “Arctic Science Diplomacy: With or Without Russia?” Geneva Centre for Security Policy Strategic Security Analysis, September, Issue 32, <https://www.gcsp.ch/sites/default/files/2024-12/ssa-2023-issue32-arctic-science-diplomacy-with-or-without-russia.pdf> //DH

**AC = Arctic Council**

At the local level, science diplomacy is implemented through development strategies for the Arctic regions and the activities of various organisations. For example, the Saami Council promotes the rights and interests of the Saami people in four countries: Finland, Norway, Russia and Sweden. Global Arctic, the Calotte Academy and the Northern Research Forum contribute to linking local and global science diplomacy agendas.14 The RAIPON organisation represents the interests of 40 indigenous peoples living in Russia’s Arctic and Far East regions15 and is a permanent member of the AC. To date, cooperation has been most effective at the interstate level due to the AC’s status. The common interest of states to develop international scientific cooperation led to the signing of the 2017 Agreement on Enhancing International Arctic Scientific Cooperation.16 This document requires signatory states to take mutual measures to remove various bureaucratic barriers to international cooperation, the exchange of scientific data and experience, and the development of education and cooperation between Arctic and non-Arctic states.

#### Russian scientists won’t participate unofficially – they fear arrest

Warren Cornwall, 2023 – journalist for Science “‘We are cut off.’ Tensions with Russia are hobbling Arctic research” Science, 5/3

<https://www.science.org/content/article/we-are-cut-tensions-russia-are-hobbling-arctic-research> //DH

Individual researchers are also struggling to keep lines of communication open. Last year, Norwegian organizers of the largest Arctic science conference, the Arctic Science Summit Week, barred Russians from participating. This year, Austrian organizers of the event allowed Russians to attend as long as they displayed no official affiliation with a Russian institution, such as listing it on a name tag. But only six Russian scientists ended up attending a gathering that drew more than 800 people, and five of those were online.

Vladimir Romanovsky, a Russian-born permafrost expert at the University of Alaska Fairbanks who carries both U.S. and Russian passports, traveled via Turkey to a conference in Siberia’s Yakutsk region this winter, where a good friend leads a permafrost research program. He says he’s glad he went, in part to encourage young researchers he met. “I will continue to support these relations just for those young people to have some hope.”

Yet he worries that a program he coordinates tracking permafrost temperatures across the Arctic is imperiled. He has had to abandon his practice of sending money to Russian colleagues to help support their work. He says they are reluctant to accept research money from abroad, fearing they will be labeled a “foreign agent”—which could put them at risk of government scrutiny or arrest. “The coming field season is in big question,” he says.

#### Wester scientists face retaliation acting in unofficial roles

Mia Bennett, 2025 - is an associate professor in the University of Washington's Department of Geography. She researches the politics of infrastructure development in the Arctic by combining fieldwork and critical remote sensing. “Trump budget cuts are destroying Arctic data” Cryopolitics, 5/8, <https://www.cryopolitics.com/2025/05/08/trump-budget-cuts-are-destroying-arctic-data/> //DH

Most of the efforts after the Cold War to integrate Russia into polar science, which had succeeded in building interpersonal ties and establishing observation networks of sensors and monitors across the country’s five million square kilometers of Arctic territory, have fallen victim to the war. Those who still try to collaborate with Russia, let alone visit the country, often face retribution. Professor Lassi Heinenen lost his emeritus position at the University of Lapland in Finland after it became known that he had traveled to Moscow for a conference on the Arctic and Russian Far East in 2024.